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ON ACETIC ACID AS A SUBSTITUTE FOR ETHYL ALCOHOL IN EXTRACTING THE ACTIVE PRINCIPLES OF SOME OFFICINAL DRUGS.

BY EDWARD R. SQUIBB, M.D., OF BROOKLYN, N. Y.

(FIRST PAPER.)

In the proposed substitution of acetic acid for alcohol as a menstruum for extracting and a vehicle for preserving and administering the active principles of drugs used in medicine, the very first question is as to the therapeutic equivalency. That is, if the presence of the necessary amount of acetic acid in fluid extracts, etc., can be shown to be therapeutically objectionable, or more objectionable than the necessary amount of alcohol, then it is not proper to make the substitutions.

But acetic acid has long been used for the extraction of cantharides, colchicum, ipecacuanha, opium, squill, etc., without developing any known therapeutical objections, and in a limited experience in the extraction of spices, and of some drugs for veterinary use, it gives extracts practically identical with those from alcohol. The acid has a universally accepted food value, not only as a hydrocarbon, but as a mild acidulous aid in the primary processes of digestion, but in the small quantities that would be present in the doses of fluid extracts, it would be practically inert, or at least as nearly inert as the alcohol which it would replace.

Its properties and value as an antiseptic, deturgent and preservative are well known, but whether it would be present in sufficient

proportion to preserve such preparations from change during a long time has not yet been determined. The oldest set of samples, made with 10 per cent. acid, are now about two years old and apparently unchanged. Fluid extract of ergot, by the official process, is preserved by acetic acid in small proportion, as first proposed and used by Prof. Wm. Procter, Jr., in 1857, and in that case an alcoholic preparation very liable to change has been made permanent.

Fluid extracts made with acetic acid menstrua are much more loaded with inert extractive matter than when made with alcohol; and this is a disadvantage, but hardly hurtful, nor more than an inconvenience occasionally.

In compounding prescriptions the acetic acid menstruum has a slight general advantage over alcohol in the amount of precipitation on dilution and on mixing, and in the character of the precipitates, these being more soluble, and containing less resin and fat and probably less of the active principle. In administration there are similar slight advantages over alcohol in that the dilutions with water at the moment of taking the doses are less muddy and unsightly, whilst the acidulous taste is less disagreeable.

From these considerations and from all that is as yet known, it is claimed that there are no serious therapeutical nor administrative objections to a more extended and more general trial of this proposed substitution, especially by the pharmacopœial authorities through the Research Committees.

The chief, though possibly not the only reason for a careful consideration of this proposed substitution is economy in the use of alcohol by the use of a cheaper solvent. The alcohol of the U.S.P., 91 per cent. by weight, costs about \$2.40 per gallon of 6 pounds 13 + ounces avoirdupois, or, say, 35 + cents per avoirdupois pound—or, say, 77 + cents per 1,000 grammes.

The acetic acid of the U.S.P., 36 per cent., costs about 10 cents per pound, or 22 cents per 1,000 grammes. When diluted to a strength of 10 per cent., which is the strength most frequently required as a menstruum, the cost is less than 3 cents per pound, as against 18 cents per pound for the Diluted Alcohol of the U.S.P., with which this 10 per cent. acid corresponds—the alcohol menstrua costing six times as much as the acid menstrua to accomplish the same extraction.

In order to measure with a fair degree of accuracy the comparative capacity of alcohol and acetic acid for extracting the active principles of drugs, it was proposed to make parallel extractions of the same drug under the same conditions at the same time. In selecting a drug for the first trial, that is most difficult to extract to complete exhaustion, *nux vomica* was taken. For the extraction of this important drug the U.S.P. has an excellent formula and process by which the seed is reduced to a powder that passes through a No. 60 sieve—60 meshes to the linear inch—and is percolated to practical exhaustion with a menstruum of about 64.5 per cent. alcohol, to the first part of which a small proportion of acetic acid is added. That is, 500 grammes of No. 60 powder is moistened with 500 c.c. of the alcohol to which 25 c.c. of 36 per cent. acetic acid has been previously added, and it is then percolated to exhaustion with the alcohol without further addition of acetic acid. This powder and menstruum were used on one series of percolations in competition with a 10 per cent. acetic acid on a very coarse powder in a corresponding series of percolations. The weight of 100 c.c. at about 23° C. of the U.S.P. menstruum with acetic acid was 88.70 grammes—without the acid 88.00 grammes, and the same volume of the acetic acid menstruum at the same temperature weighed 101.43 grammes. The percolates were received in 100 c.c. fractions in narrow-neck flasks, and weighed at about this temperature, and the weights of the menstrea subtracted from the weights of the percolates gave the series of differences that are shown in the table to indicate the rates of exhaustion.

About 10 kilogrammes of good, well-seasoned *nux vomica* was taken from a lot of 2,300 pounds and very coarsely ground so that all of it was passed through a No. 9 sieve. Then half of this was powdered and all passed through a No. 60 sieve for the U.S.P. percolations, thus making sure that the fine and coarse were as nearly alike as practicable. Then each portion, fine and coarse, was carefully assayed, the powder giving 2.80 per cent. of mixed alkaloids, and the ground giving 2.93 per cent. of mixed alkaloids; and therefore 1,500 grammes of the powder would contain 42.00 grammes of alkaloids and the same quantity of ground would contain 43.95 grammes of mixed alkaloids, to be washed out by the different menstrea.

The process of repercolation¹ was used for the extractions, and syphon percolators—and these were so managed that the mass of solid contents was kept entirely filled with the menstruum as indicated by a stratum of menstruum on top of the mass and the percolate rising in the well-tube to near the level of the menstruum on top. This mass in saturation was allowed to stand covered for forty-eight hours when the syphon was put in place and started, being held so high as to draw only from the upper part of the well-tube, and at a rate of dropping so slow as to yield two to three fractions of 100 c.c. each in the twenty-four hours.

If this dropping could be so slow that its rate when multiplied into the whole mass would reduce the downward flow of the liquid between the solid particles to the same rate of downward flow as that which passed through the particles, then the percolation would be ideal, and one stratum of menstruum would pass downward as a piston, and the exhaustion would be complete with the smallest quantity of solvent that could hold all the soluble matters. This principle, underlying all percolation, being kept in mind, the rate was kept slow, and to control loss by evaporation the outer, turned up end of the syphon was kept well within the flask receiving the fraction of percolate.

Three portions of 500 gramme each of each powder—fine and coarse—were taken for the repercolation, and parallel percolations were carried along together, the fine U.S.P. powder with the U.S.P. alcoholic menstruum, and the coarse with the acetic acid menstruum. The percolates were received in long-necked 100 c.c. flasks remarked for that capacity at 23° C. Each fraction as received was adjusted to the mark and weighed, the weighing being done to the nearest centigramme, and the measuring to the nearest tenth of a cubic centimetre.

From the weight of each 100 c.c. fraction the weight of the menstruum was subtracted and the difference noted. These differences

¹This process of repercolation originated with the writer thirty odd years ago, see *Proceedings* of the Amer. Pharm. Assoc., for 1866, p. 85, and was elaborated through a series of papers on economizing the use of alcohol in extracting drugs, published through several years' *Proceedings* for 1865, p. 201; 1867, p. 391; 1870, p. 166; 1872, p. 182. This last paper is a note on a new form of percolator, and in it the syphon percolator now used for so many years, is first described and figured. The final paper of this series is in *Proceedings* for 1873, p. 548.

make up the following table, which shows approximately the rate of exhaustion as each fraction was received.

The first portion of 500 grammes of U.S.P. fine powder was moistened with the U.S.P. proportion, or 500 c.c. of 64.5 per cent. alcohol, to which 25 c.c. of 36 per cent. acetic acid had been previously added, and macerated for 48 hours in a closely covered vessel. It was then packed in a syphon percolator and 600 c.c. of the 64.5 per cent. alcohol, without acetic acid, was poured on top in successive portions of about 100 c.c. each until a stratum remained permanent on top, and the percolate in the central well-tube stood nearly up to the level of the stratum of menstruum on top. In this condition it was closely covered and allowed to digest for 24 hours. Then the syphon was put in place, started and adjusted so high as to control the rate of dropping to an average of about three or four drops per minute during the day, and very much slower, or at rest, during the night, when the columns in the syphon legs reached a balance, as no more menstruum was poured on top during the night.

The first five fractions after having been separately weighed were added together in a 500 c.c. flask remarked for 23° C., and the few drops needed to make up the measure were added from the sixth fraction.

Then 10 c.c. of this 500 was carefully measured off into a 12 centimetre flat-bottom, tared capsule, and evaporated on a water-bath until it nearly ceased to lose weight. The weight of this extract multiplied by 50 was accepted as the total extract contained in the 500 c.c. of percolate.

The second five fractions of percolate were weighed, the differences taken, and they were then added together and made up to 500 c.c., as before, and then 25 c.c. of 36 per cent. acetic acid having been added, the 525 c.c. was used to moisten the second portion of 500 grammes of fine U.S.P. powder. This was then digested, packed and percolated as the first portion, and the fractions of weak percolate from the first portion first, and fresh menstruum afterwards, were poured on top until the exhaustion was complete, as judged by the weight and taste of the fractions. The fractions of this second portion were managed exactly as those from the first portion, and 10 c.c. of the 500 evaporated to dryness for proportion of extract in the same way, and the capsule and extract were reserved for assay.

The second five fractions of the second portion were put together,

made up to 500 c.c., 25 c.c. of 36 per cent. acetic acid added, and the whole 525 c.c. used to moisten the third and final portion of 500 grammes of U.S.P. fine powder. Then this final third portion was percolated exactly as was the second portion, the fractions of weak percolate from the second being put upon the third, and then fresh menstruum to exhaustion. As the repercolation was not to be carried farther in this instance, there was no present use for the fractions of weak percolate coming from this third portion, except to show the extent and rate of exhaustion—the exhaustion being found to be practically, though not quite, complete after the seventeenth fraction, as judged by the bitterness of the residue and the assays when the percolation was carried on to the twentieth fraction. The first five fractions of this third portion were put together and made up to 500 c.c. as in the other portions, and, by assay, this 500 c.c. was found to represent the 500 grammes of fine powder in the proportions of cubic centimetres for grammes. The second and third five fractions of this third portion were made up to 500 c.c. each and were weighed and assayed for extracts and for alkaloids; and, finally, the seventeenth fraction was also assayed, thus finishing the series managed by the excellent process of the U.S.P. with the alcoholic menstruum, and with such results the principal reasons for substituting acetic acid for alcohol are economy in cost and easier and better exhaustion.

The parallel repercolations to be compared with this U.S.P. process as a standard, were managed exactly in the same way, at the same time, with only the difference that the 1,500 grammes of the same *nux vomica* was very coarsely ground, and 10 per cent. acetic acid was used as a menstruum instead of the U.S.P. alcohol. The very coarse grinding not only saves much labor, but is essential to the success of the acid menstruum, since with a fine powder the mass is liable to form a mud-like mixture that is not percolable. With this difference only, the description of the U.S.P. process applies equally to that with acetic acid menstruum, and the following table gives the differences in weight for each 100 c.c. fraction, between the weight of 100 c.c. of menstruum and 100 c.c. of percolate. The weight of 100 c.c. of that part of the U.S.P. menstruum that contained the acetic acid was 88.70 grammes. An equal volume of the alcohol menstruum without acetic acid was 88.00 grammes. The weight of 100 c.c. of the 10 per cent. acetic acid menstruum

was 101.43 grammes. These weights added to the differences of the table give the weights of the fractions of percolate.

RATE AND DEGREE OF EXHAUSTION BY DIFFERENCES.

PERCOLATE.	FIRST PORTION.		SECOND PORTION.		THIRD PORTION.	
	U.S.P. Differ- ences. Grammes.	Acetic Acid. Differ- ences. Grammes.	U.S.P. Differ- ences. Grammes.	Acetic Acid. Differ- ences. Grammes.	U.S.P. Differ- ences. Grammes.	Acetic Acid. Differ- ences. Grammes.
1st fraction	3'34	6'03	3'69	7'16	5'89	7'42
2d "	3'66	5'77	4'48	7'26	6'07	7'68
3d "	3'22	5'01	4'53	6'48	5'70	6'69
4th "	2'69	4'42	4'46	6'c3	5'54	5'71
5th "	2'09	3'47	3'91	4'83	4'78	5'37
6th "	2'23	2'84	4'29	4'22	4'72	4'86
7th "	1'79	2'17	3'19	2'91	3'50	4'26
8th "	1'33	1'95	2'40	2'02	3'06	3'00
9th "	1'17	1'21	1'57	1'44	2'33	1'97
10th "	1'12	'85	1'43	1'18	1'89	1'52
11th "	'77	'72	'94	'74	1'69	1'02
12th "	'51	'40	'94	'72	1'52	'86
13th "	'37	'06	'70	'53	1'16	'62
14th "	'27	'18	'84	'37	1'00	'72
15th "	'15	'09	'36	'33	'79	'33
16th "	'19	'13	'33	'26	'76	'43
17th "	'11	'05	'34	'29	'65	'27
18th "	—	—	'26	'14	'61	'32
19th "	—	—	'18	'00	'47	'11
20th "	—	—	—	—	'33	'06

The next table deals with the percolates in groups of five fractions each, the measure being made up to 500 c.c. as described above, and these larger fractions were assayed for measure and weight of fraction—for total extract—for chloroform extract and for total of mixed alkaloids.

The most significant showing of this table, and the most important to the proposed substitution, is, that in the first three lines of the table the alcoholic menstruum has extracted 85.3 per cent. of the total alkaloids present, while the acetic acid menstruum has extracted 89.8 per cent. And that in the fifth line the amount of

alkaloids not extracted is as 91 for the U.S.P. menstruum against 27 for the acetic acid menstruum.

Then as a broad general result, it is claimed to have been shown that by the substitution of the acetic acid menstruum for the alcoholic, one-half the cost of grinding, and five-sixths of the cost of menstruum are saved, an equivalent product being obtained in larger quantity.

NUX VOMICA REPERCOLATIONS.

Three Successive Portions of 500 Grammes each for each Menstruum.

500 GM. PORTIONS.	500 C.C. PERCOLATES.	U.S.P. MENSTRUUM. 64.5 p.c. Alcohol with a small proportion of Acetic Acid.				ACETIC ACID MENSTRUUM. 10 p.c. Acetic Acid.			
		Weg't. Gm.	Ex- tract. Gm.	Chlo- ro'f'm Ext'ct. Gm.	Alka- loids. Gm.	Weg't. Gm.	Ex- tract. Gm.	Chlo- ro'f'm Ext'ct. Gm.	Alka- loids. Gm.
1st Portion . .	1st 500 C.C.	457'76	54'80	15'50	10'56	551'20	78'00	12'00	11'19
2d " . .	1st 500 C.C.	463'88	60'00	17'50	12'01	538'10	104'00	16'00	13'74
3d " . .	1st 500 C.C.	471'05	72'50	20'00	14'74	539'69	104'80	21'00	14'65
" " . .	2d 500 C.C.	454'38	30'50	9'50	5'46	521'80	51'50	9'50	4'20
" " . .	3d 500 C.C.	443'36	2'50	1'00	0'91	508'36	4'00	0'50	0'27
" " . .	17th Fraction	88'65	0'40	0'16	0'07	101'70	0'48	0'08	0'06
					43'75				44'11
		Original assays . . .			42'00				43'95

The weighing and measurements of the first three columns of the table are actual upon the scale of the figures given. Those of the other columns were obtained as follows: 10 c.c. was accurately measured off from each 500 c.c. of percolate, and was evaporated until it practically ceased to lose weight. The weight of this extract multiplied by 50 is given in columns four and eight as being the extract present in the 500 c.c. This extract from 10 c.c. was then dissolved in ammoniated alcohol and the alkaloid shaken out with chloroform and ether mixture. The chloroform and ether were boiled off and the extract dried until it practically ceased to lose weight. This weight multiplied by 50 is given in columns five and nine as being the chloroform extract in the 500 c.c. of percolate. This extract titrated with decinormal acid and alkali gave the total alkaloids in the 10 c.c., which, multiplied by 50 gave the figures of columns six and ten. Hence all these figures are subject to the risk of multipli-

cation of error. But when they are compared with the actual assays of the drug percolated, they are as close as could be expected. The original assays were for the U.S.P. fine powder 2.80 per cent., or 42 grammes in the 1,500 grammes of powder against 43.75 grammes as footed up in the table.

For the coarsely ground drug the original assay was 2.93 per cent., or 43.95 grammes in the 1500, against 44.11 grammes as footed up in the table.

It will be seen by the table that the first 500 c.c. of the third 500 grammes of both powders give a fluid extract that represents cubic centimetre for gramme, but 100 c.c. of these will contain 2.8 grammes of mixed alkaloids instead of 1.5 gramme as prescribed by the U.S.P. for its Fluid Extract.

These fluid extracts are both very dark brown liquids, the alcoholic one being much the darker, and after six weeks' standing it is very bright and clear, and has a very small gray deposit. That with the acid menstruum is clear and fairly bright, and without deposit. It has a very distinctly acid odor—stronger of acid than the other has of alcohol, and it contains about 8.1 per cent. of free acid. The dose of the Fluid Extract being about 0.18 c.c., or three minims, this proportion of free acid in it would not be perceptible, and would be entirely insignificant.

The tables show that the acid preparation has a much larger proportion of inert extractive matter, and this would be objectionable if it was largely precipitable on dilution. But it gives much less precipitate on dilution than the alcoholic, and that which it does give is not liable to carry down alkaloids soluble in an acid solution.

Actual experience in the use of preparations made with the new menstruum is as yet not large. Still, throughout the past two years, a steadily increasing number of fluid extracts and extracts have been made and have been confidently supplied and recommended in the veterinary profession where large doses are required, and where diminished cost is of great importance, and where close observation of effects and results are easily made. As a result of this distribution many letters have been received from veterinary surgeons to the effect that the use has been quite successful, and that in the increasing list, now embracing all of the more important extracts and fluid extracts, no drawbacks have yet been discovered.

There has seemed to be no necessity for a new or changed name

for these preparations. They are simply extracts and fluid extracts made with a new menstruum, and when they are recognized by the U.S.P., the present officinal names will doubtless remain unchanged, as it is only the menstruum that is changed, the quality and strength being undisturbed. For the present it is considered sufficient to place conspicuously on the label, under the U.S.P. title the words "Made with acetic acid," especially as the new menstruum involves no increase of risk of serious mistakes.

It is proposed that the next paper shall investigate the very important and very difficult exhaustion of cinchona.

THE ASSAY PROCESS.

Early in this investigation it became necessary to have a convenient and fairly accurate process of assay for the mixed alkaloids. The short and easy methods of Messrs. Dunstan and Short, given in the *British Pharm. Journ. and Trans.*, 3d Series, Vol. XIII, pp. 665-1055, and Vol. XIV, p. 621, and given in the *British Pharmacopœia*, were found objectionable on some accounts, but chiefly because the results are too high. For example, a table is given at p. 1055, wherein from seven samples the percentage of total alkaloids ranged from 3.04 to 3.90 per cent., with an average of 3.29 per cent. This, in the writer's experience, is much too high, and there is a probability that the plus error may be due to weighing the chloroform extract as alkaloids. The most recent authority noticed is the new, 1898, *British Pharmacopœia*, but its method is liable to the same objection of weighing a chloroform extract as alkaloid. The U.S.P. of 1890 has an excellent method that avoids this source of error by titrating the alkaloids. This method—U.S.P., 1890, pp. 152, *et seq.*—first makes a dry extract and then assays that for use in its standardized preparations.

Two grammes of the dry extract is dissolved by shaking in a separator with 20 c.c. of a previously-made mixture of 2 volumes of alcohol (91 per cent.), 1 volume of water of ammonia (10 per cent.), and 1 volume of water. Then 20 c.c. of chloroform (99 per cent.) is added, and the mixture is agitated during five minutes. The chloroform is then allowed to separate and is drawn off as far as possible by the stopcock. This washing out is repeated with two farther portions of chloroform of 15 c.c. each. The chloroform solutions are then collected in a beaker and exposed on a water-

bath until the chloroform and ammonia are completely dissipated.

Then 10 c.c. of decinormal sulphuric acid is added, stirred, diluted with 20 c.c. of hot water, and when solution is complete 2 c.c. of brazilwood indicator is added. Centinormal potassium hydrate is added until a permanent pinkish color is produced. The number of cubic centimetres of potassium hydrate required is divided by 10, the number found is subtracted from 10, and the remainder is multiplied by 0.0364, and that product by 50, which will give the percentage of total alkaloids in the 2 grammes of extract taken, it being assumed that strychnine and brucine are present in equal proportion, and the above factor being found by taking the mean of their respective molecular weights ($334 + 394 \div 2 = 364$).

This very well designed method was found impracticable in the writer's hands, through difficulty in carrying out the details. The first obstruction encountered was the very nearly constant emulsifying of the chloroform and the constant refusal of the liquids to separate on standing, and the difficulty and loss of time in managing an emulsion once formed. The U.S.P. directs the immiscible liquids to be "agitated," not shaken; yet if shaking be avoided and the agitation be ever so cautiously managed some emulsion seems unavoidable, whilst a degree and kind of agitation that is short of shaking washes out the alkaloids imperfectly. Emulsions that did form were best managed by running them out into a capsule, driving off the chloroform on a water-bath, returning the dark liquid to the separator, and managing the next chloroform with greater care. But a better expedient was found in a recommendation of A. H. Allen and others, to use a mixture of equal volumes of chloroform (99 per cent.) and ether (96 per cent.). With this mixture, used in large quantity, vigorous shaking and consequent effective washing may be employed with little emulsion, if any, at the last of the washings, the separations being very prompt and sharp, usually ready to draw off within half an hour after shaking. The clear chloroform and ether solutions are better managed if drawn off into and boiled off from a flask, as the dissolving, the heating up and the titration are more easily done in a flask. The solution to be titrated is always of a full yellow color, from a bright pale yellow to a deep yellow, with a reddish tint by reflected light, a color in which the first increase of pinkish tint is difficult to

detect, and the want of sharpness and decision in this end reaction is the persisting* difficulty with all methods of titration that were tried, but in comparing indicators brazilwood was found to be inferior to logwood. A decinormal potassium hydrate is preferable to centinormal, as it does not dilute the solution of alkaloids so much, while in accuracy of reading it is far within the limit of error of the indicator.

Chiefly in consideration of these conditions the following method was reached and used :

A fair sample of *nux vomica* is drawn and an average dozen or so of the seed is so milled as to pass through a No. 9 sieve. Of this 10 grammes is weighed off and exhausted with 10 per cent. acetic acid. This exhaustion is easily and conveniently done in a Soxhlet apparatus, but so large an amount of extractive is washed out by the warm acid, that the extract is very difficult to dry, and afterwards at once forms an emulsion that is difficult and tedious to manage. Cold percolation to complete exhaustion gives a much better result, and is not difficult to effect, provided the powder be moistened for packing with not more than 10 c.c. of the acetic acid, and be not packed too tightly.

The percolate is evaporated to dryness on a water-bath, in a large (12 centimetre) flat-bottom capsule, so that the extract is in a thin layer, easy to dry and easy to dissolve. The weight gives the yield of extract.

If a fluid extract or tincture is to be assayed, it is measured, weighed and dried in the same way.

A mixture is made of two volumes of alcohol (91 per cent.), one volume of water of ammonia (10 per cent.), and one volume of water, and of this, 10 c.c. is poured upon the dry extract in the capsule. Then by patiently moving a stirrer over the smooth surface of the dry extract for a quarter of an hour or more, a smooth solution of the extract, easy to wash, is obtained. This is poured into a separator of 150 c.c. capacity, and the capsule and stirrer are rinsed clean with 10 c.c. more of the alcohol and ammonia solution.

A mixture is made of equal volumes of chloroform (99 per cent.) and ether (96 per cent.), and 40 c.c. of this is added to the liquid in the separator, and the whole is shaken vigorously during five minutes, and then allowed to separate. In twenty to thirty minutes the separation will be complete to a sharp line, when the depth of

the upper, dark stratum should be observed and measured. The chloroform-ether solution is then drawn off into a tared flask of about 100 c.c. capacity, and the flask is immersed in a hot water-bath so that the chloroform-ether may be boiled off by the time another washing is ready. In the meantime 40 c.c. more of chloroform-ether has been added to the contents of the separator, and the shaking, separating and drawing off into the flask repeated. This second washing may or may not be then followed by a third, managed in the same way, if required.

If after standing, to separate completely a second time, the dark liquid on top shall be found to have increased in depth, the indication is that emulsion has been formed to that extent, and that the chloroform forming that emulsion holds the proportion of alkaloids present in solution at the time that emulsion was formed, and as the chloroform cannot be washed out of an emulsion, so the alkaloids held by that chloroform cannot be washed out. Therefore, in the case of any considerable amount of emulsion after the chloroform-ether solution is drawn off into the flask, the dark liquid is drawn off into the flat capsule and warmed on a water-bath until all the chloroform-ether is driven off. The dark liquid is then returned to the separator and again washed as before. If a small amount of emulsion again forms, as very rarely occurs, the chloroform in it holds so very little alkaloid as to be within the limit of error of the method.

The tared flask will then contain the total chloroform extract, and the weight of this was long erroneously accepted as the weight of alkaloids.

Then 10 c.c. of decinormal sulphuric acid is carefully measured from a burette into the flask, and is rinsed round and warmed by immersion in a water-bath until the soluble alkaloids are dissolved, when the insoluble residue will show that much of this extract is not alkaloid.

Then 20 c.c. of hot water is added to the contents of the flask, and a definite quantity (10 drops) of logwood indicator. The color is then closely observed by transmitted light, and matched by a similar quantity of liquid in a similar flask. Decinormal potassium hydrate is now dropped in from a burette until the color changes slightly to a pinkish tint or shade of the original yellow by transmitted light, and when this hardly perceptible change is now looked at by reflected light the pink tint is very distinct.

The number of cubic centimetres required subtracted from 10 (cubic centimetres of acid used) gives the number of cubic centimetres of acid saturated by alkaloids, and this number multiplied by the mean of the molecular weights of the two alkaloids ($0.0334 + 0.0394 \div 2 =$) 0.0364 , gives the amount of alkaloids obtained from the 10 grammes of nux vomica, the strychnine and brucine being assumed to be present in equal proportions.

Then as 10 is to the product from 10, so is 100 to the percentage of the mixed alkaloids.

EMETINE OCTOIODIDE AND THE EXTRACTION AND ESTIMATION OF ALKALOIDS GENERALLY.

BY H. M. GORDIN AND A. B. PRESCOTT.¹

In a previous paper² we have shown that most alkaloids form definite compounds when treated with excess of iodo-potassium iodide, and that it is possible to estimate the strength of aqueous solutions of alkaloidal salts by means of standardized solutions of iodine and of sodium thiosulphate. In applying this method to the assay of medicinal drugs it is immaterial what method of extraction of the alkaloids from the drug is employed, provided the final alkaloidal solution be sufficiently deprived of non-alkaloidal matter. The simplest and quickest method of obtaining the alkaloidal solution sufficiently free from foreign matter is undoubtedly the method proposed by Dr. A. B. Lyons.³

This consists in macerating a weighed quantity of the powdered drug in a definite volume of Prollius' fluid with frequent shaking for several hours, drawing off an aliquot part of the clear liquid, evaporating and taking up the residue with acidulated water. The alkaloidal solution obtained by this method is generally almost perfectly colorless, and can be worked up further for a gravimetric estimation by shaking out the alkaloids with chloroform and ammonia. For our iodometric method the filtered solution can be treated directly with excess of iodine, the excess of which is then estimated by sodium thiosulphate. For the alkalimetric estimation,

¹ In the work of Research Committee D, Section 2, Committee of Revision and Publication of the Pharmacopœia of the United States.

² *J. Am. Chem. Soc.*, vol. 20, p. 706, Sept., 1898.

³ "Manual of Pharm. Assaying," Haynes & Co., Detroit, Mich., 1886, p. 20.

again, the same filtered solution may be taken, using standardized acid in excess and estimating the excess by means of standardized alkali. The only drawback to this method of extraction is the great difficulty of preventing loss by evaporation of the highly volatile solvent, by which loss the volume of the aliquot part becomes reduced and the final figure is liable to be too high.

A GENERAL METHOD OF EXTRACTION.

In order to avoid this difficulty we have worked out an entirely different method of alkaloidal extraction, which can also be used with any one of the methods of estimation as desired. In its main features this method is the same as that which we proposed for the assay of opium.⁴ It is carried out in the following manner:

One to four grams of the finely-powdered drug is weighed into a low wide-mouthed vessel with a round bottom, holding eight or ten ounces, and having a well-fitting cork, such as a screw-top ointment-jar.⁵ The powder is rubbed up with a small pestle to a fine paste by adding a little of an ethereo-ammoniacal mixture, composed of stronger ammonia water and alcohol each 5 c.c., chloroform 10 c.c. and ether 20 c.c. Then a few more cubic centimeters of this mixture are added, so as to have the drug well covered with the liquid, using in all about five times the amount of the drug taken. The vessel is corked, with the pestle inside, and is set aside for about four or five hours, taking care to agitate by circular movement very frequently during that interval. After that time the cover is removed and the vessel kept in a current of air, stirring frequently till all odor of ammonia has disappeared. With a good draught and frequent stirring the powder will be almost perfectly dry in about two hours. The vessel is then put into a vacuum desiccator over sulphuric acid for about four or five hours.

Any amount of powdered sodium chloride equal to about five or six times the amount of drug employed is then carefully mixed in, with use of the pestle, and the whole thrown into a small percolator, one provided with a glass stop-cock and having a plug of cotton at the bottom.⁶ The vessel is then cleaned out several times

⁴ *J. Am. Chem. Soc.*, 1898, vol 20, p. 724; *Pharm. Archives*, 1898, p. 121.

⁵ An ordinary teacup fitted with a specie cork answers well.

⁶ A suitable percolator is easily made out of an ordinary piece of glass tubing fitted with a perforated cork, through which passes a tube having a glass stop-cock.

with small quantities of sodium chloride, and the cleanings added to the percolator. The mixture in the percolator is then covered with a piece of cotton, which is pressed down with a piece of glass, and a suitable menstruum, usually chloroform, is poured slowly into the percolator till the menstruum reaches the stopcock. The latter is then closed, the percolator covered, and set aside for five or six hours. After that time the stopcock is opened, and the drug exhausted with the menstruum, percolating until ten drops of the percolate evaporated on a watch glass, and the residue taken up with a few drops of acidulated water, shows no turbidity whatever on adding a few drops of Wagner's reagent. The percolate is received in a flat evaporating dish, and when finished is placed in a good draught at a temperature of about 30° C. When the liquid is reduced to a very small volume, 10 c.c. of acidulated water⁷ is added, and then a few cubic centimeters of ether or petroleum ether, so as to have an ethereal liquid cover the aqueous solution,⁸ when the whole is stirred with a glass rod until all the ethereal liquid is driven off. The liquid is then filtered and the evaporating dish and filter washed several times with acidulated water. In this way is obtained a colorless solution of the alkaloid, which can be taken for any method of assay.

In the periodide method of assay the final alkaloidal solution obtained, whether by our method, by Dr. Lyons' method, or by any other method, this final solution representing a definite quantity of the drug to be assayed, is poured slowly and with constant stirring into a flask holding 100 c.c., into which has been previously drawn 20 or 30 c.c. of a standardized solution of iodine and 1 or 2 c.c. of dilute hydrochloric acid⁹ (U.S.P.). The flask is then filled up to 100 c.c., stoppered and well shaken till the periodide has separated out. The supernatant liquid is to be perfectly transparent but of a red iodine color. Fifty c.c. are then filtered off, and in this portion the excess of iodine determined by means of standard sodium thio-

⁷ If an alkalimetric assay is intended the acidulated water in the operation should be standardized and taken in definite quantities.

⁸ If the menstruum is all evaporated off it is sometimes difficult to dissolve out the alkaloids with acidulated water. If chloroform be used, coming below the aqueous layer, it evaporates too slowly.

⁹ Except in a case of morphine an excess of acid is not hurtful and even promotes the separation of the periodide. Hydrochloric is preferable to sulphuric acid.

sulphate. The amount of iodine consumed, multiplied by the suitable factor, gives the amount of alkaloid present in the quantity of drug taken.

In the case of several alkaloids being present in the drug a mean iodometric factor can be deduced in the same way as is done in the alkalimetric assay. It is to be noticed that, if there should be no precipitate with iodine, but only a slight turbidity, then the drug is extremely poor and for the assay a much larger quantity than 4 grams should be taken. On the other hand, if after adding the alkaloidal solution to the iodo-potassium iodide solution and separating the periodide by shaking, the supernatant liquid should have very little color or be almost colorless, then it is certain that the drug is very rich, and either a smaller quantity of the drug or a larger quantity of the iodine solution must be employed in the assay.

The method of extraction described above presents particular advantages in those cases where several alkaloids soluble in different menstrua are present in the drug, as by using these menstrua successively a separation of the alkaloids can be easily effected. This principle we have applied to the assay of opium, and it seems also to be applicable to *Hydrastis canadensis*, upon which we intend to publish a report in the near future.

This method of extraction of alkaloids for assay purposes has given us very good results with all drugs experimented upon, except ipecac root. For some unaccountable reason it is almost impossible to extract completely free emetine, which is liberated in our process by the ethereo-ammoniacal mixture, from this root by percolation. Ether, chloroform and acetone were tried as menstrua, but in all cases the result was much lower than that obtained by Lyons' process.¹⁰ Though the percolation was not interrupted till a few drops tested in the general way with Wagner's reagent gave no reaction whatever, the very low result as compared with that obtained by Lyons' method shows conclusively that the exhaustion cannot be made complete by percolation. This fact would possibly explain why Flückiger,¹¹ who extracted ipecac by percolation with ammoniated chloroform, obtained exceptionally low results.

¹⁰ It is Lyons' general method, not his modification of Dragendorff's method, that is referred to here.

¹¹ Pharm. Ztg. 1886, No. 30. See also Guareschi, Einführ. in d. Stud. d. Alkal. 1896, 527.

In the assay of ipecac, given at the end of this paper, the method used was that of Dr. Lyons. The other drugs have been extracted by our method as described above, and the results compared with those obtained by Lyons' method.

The periodide assay method applied to nux vomica, along with a modification of Dunstan and Short's method of separation of strychnine from brucine¹² affords a convenient way of separate estimation of each of these alkaloids in the drug, as follows:

The acidulated alkaloidal solution obtained from nux vomica in any suitable way, and representing 4 grams of the drug, is made up to a definite volume, say 100 c.c. Of this solution 25 c.c., which represent 1 gram of nux vomica, is run from a burette into a 100 c.c. flask in which has been placed 20 c.c. of decinormal iodine solution and 2 c.c. dilute hydrochloric acid, and the amount of iodine consumed by the total alkaloids contained in that 1 gram of nux vomica is reached in the way described above. Let that amount be a . If only the amount of total alkaloids in the nux vomica is desired it is sufficient to multiply a by 47.845 which is equal to one hundred times the mean factor of strychnine and brucine, and the percentage of total alkaloids is at once obtained.

THE SEPARATE ESTIMATION OF STRYCHNINE AND BRUCINE.

For the separate estimation of each of these alkaloids, another portion of the alkaloidal solution, representing 2 grams of the nux vomica, that is 50 c.c., is run out from the burette into an Erlenmeyer flask of the capacity of about 300 c.c., and to the contents of the flask 10 c.c. of a 2 per cent. solution of sulphuric acid is added, and then water enough to make in all about 200 c.c. Then pour in 25 c.c. of a 5 per cent. solution of potassium ferrocyanide, stopper the flask and shake continuously for about half an hour. Now filter, wash the precipitate on the filter repeatedly with water containing 1 per cent. of sulphuric acid, till a few drops of the filtrate diluted with a little water have no bitter taste. The filter is then pierced and the precipitate rinsed with the wash bottle into a 100 c.c. flask. To the contents of the flask is then added 20 c.c. of a 5 per cent. solution of zinc sulphate, and the flask kept on a boiling water bath for about fifteen minutes. The zinc sulphate decomposes the strychnine ferrocyanide, zinc ferrocyanide is precipitated and strychnine

¹² Pharm. J. Trans. (3) 14, 290; AM. J. PHAR. 1883, 579.

nine sulphate remains in solution. The flask is then completely cooled, and water enough added to make 100 c.c. Of this 50 c.c., representing again 1 gram of the nux vomica but deprived of the brucine, are then filtered off and run out from the burette into a 100 c.c. flask containing 20 c.c. decinormal iodine solution, and about 2 c.c. of dilute hydrochloric acid. The amount of iodine consumed by the strychnine alone is then determined as above. Let it be b . Then $b \times 43.9$ (one hundred times the strychnine factor) gives the percentage of strychnine and $(a-b) \times 51.79$ is the percentage of brucine in the nux vomica.

To test the exactness of this method we prepared a solution containing known quantities of each of these alkaloids and determined these by the described method. The results as can be seen from the following table are fairly satisfactory, if we consider the well-known difficulties of this separation.

The solution contained 0.16 per cent. strychnine and 0.22 per cent. brucine (anhydrous).

Iodine consumed by 10 c.c. before the re- moval of brucine.	Iodine consumed by 10 c.c. after the re- moval of brucine.	Found		Contained	
		Strychnine	Brucine.	Strychnine.	Brucine.
0.0843130	0.032397	0.14	0.24	0.16	0.22
0.0843132	0.032397	0.14	0.24	0.16	0.22

Following is a report of drugs which we have so far assayed both gravimetrically and iodometrically. The factors are those given for the higher periodides in our previous paper.¹³ For nux vomica the mean factor was taken, which is equal to 0.47845 parts of total alkaloids for 1 part iodine consumed. For ipecac root the factor 0.5453 is used, which is based upon the fact that, as shown at the end of this paper, emetine forms a hydriodide heptaoidide when treated with excess of iodo-potassium iodide.

Taking Lefort and Wurz's formula for emetine we get

$$7 \times 126.53 : 482.98 :: 1 : \text{factor} = 0.5453.$$

The factors for the drugs of the table are as follows:

Mean factor of strychnine and brucine	0.47845
Atropine	0.2849
Emetine	0.5453

¹³ *J. Am. Chem. Soc.*, 1898, 20, 724.

DRUG.		Quantity Taken for Assay. Grams.	Iodine Consumed.	PERCENTAGE OF ALKALOIDS.	
				Iodo- metric.	Gravi- metric.
Nux Vomica	Iodo- { 1 . . .	1	0'0526816	2'52	—
	metric { 2 . . .	1	0'0526725	2'52	—
	Gravi- { 1 . . .	1	Alkaloids shaken out	—	2'73
	metric { 2 . . .	1	and weighed.	—	2'73
Belladonna Root	Iodo- { 1 . . .	2'5	0'0459179	0'52	—
	metric { 2 . . .	2'5	0'0459263	0'52	—
	Gravi- { 1 . . .	2'5	Alkaloids shaken out	—	0'51
	metric { 2 . . .	2'5	and weighed.	—	0'51
Belladonna Leaves	Iodo- { 1 . . .	5	0'0478286	0'27	—
	metric { 2 . . .	5	0'0475922	0'27	—
	Gravi- { 1 . . .	5	Alkaloids shaken out	—	0'28
	metric { 2 . . .	5	and weighed.	—	0'28
Ipecac Root	Iodo- { 1 . . .	2	0'0957764	2'61	—
	metric { 2 . . .	2	0'0986635	2'69	—
	Gravi- { 1 . . .	2	Alkaloids shaken out	—	2'63
	metric { 2 . . .	2	and weighed.	—	2'62

EMETINE OCTOIODIDE.

Emetine seems to form with iodine two periodides, according to whether the iodine is added to the alkaloid, or *vice versa*, but owing to the lack of material we have only isolated and analyzed one, namely the higher periodide. The emetine used was obtained from Merck & Co. The periodide was made by pouring 200 c.c. of a solution of emetine in acidulated water, this solution containing about $\frac{1}{2}$ per cent. of the alkaloid into about 500 c.c. of a solution which contained about 1 per cent. of iodine with $1\frac{1}{2}$ per cent. of potassium iodide, and was strongly acidulated by hydrochloric acid. The mixture was shaken till the supernatant liquid became perfectly transparent; the precipitate was separated by means of the pump, quickly washed with cold water and then dried, first on porous plates and then in vacuum over sulphuric acid.

Thus obtained the periodide is a dark brown powder, hardly soluble in benzol, ether or chloroform, quite soluble in alcohol and very soluble in a mixture of 4 parts of alcohol and 1 of chloroform. The chloroform greatly increases the solubility of the periodide in alcohol, though chloroform alone hardly dissolves it. So far we have not been able to recrystallize it. On evaporation of the solvent a viscous mass is generally left. Authorities differ with regard to the formula of emetine, as follows:



¹⁴ *Ann. Chim. Phys.* (5) 12, 247.

Glénard,¹⁵ $C_{30}H_{44}N_2O_4 = 494.96$.

Kunz,¹⁶ $C_{30}H_{40}N_2O_5 = 506.92$.

Paul and Cownly,¹⁷ $C_{15}H_{22}NO_2 = 247.48$.

Our periodide corresponds best to the formula of Lefort and Wurz.

It seems to be emetine hydriodide heptaoidide, $C_{28}H_{40}N_2O_5 \cdot HI_7$.

For the estimation of the additive iodine the periodide is dissolved in chloroform mixed with alcohol and titrated with standardized sodium thiosulphate, using starch as indicator. It is best to add first an excess of the thiosulphate solution, then add considerable water, when the excess is titrated back with standardized iodine. For the total iodine the periodide is dissolved in a little chloroform mixed with a few drops of alcohol; powdered zinc is then added, and the mixture kept on a water bath till effervescence (from the action of zinc on the chloroform) ceases. To the mixture when cold ammonia water is added and the iodine in the zinc and ammonium iodide is estimated exactly as described in the analysis of morphine tetraiodide.¹⁸

For additive iodine 0.1492 gram of the periodide gave 0.0880045 iodine, and 0.122 gave 0.072725 iodine.

	Calculated for $C_{28}H_{40}N_2O_5 \cdot HI_7$.	Found.
(1)	59.24	59.98
(2)	59.24	59.61

For total iodine 0.1313 of the periodide gave 0.0890502 iodine; and 0.12095 gave 0.0818797 iodine.

	Calculation for $C_{28}H_{40}N_2O_5 \cdot HI_7$.	Found.
(1)	67.69	67.82
(2)	67.69	67.69

CHEMICAL LABORATORY OF THE UNIVERSITY OF MICHIGAN,

November 6, 1898.

¹⁵ *Ann. Chim. Phys.* (5) 8, 233.

¹⁶ *Arch. d. Pharm.*, 225 (1887) 461-232, (1894) 466.

¹⁷ *Pharm. J.* (3) XXIV. 61.

¹⁸ *J. Am. Chem. Soc.*, 1898, XX, 717.

Ammoniacal Collodium for Insect Stings is prepared (*Sudd.-Apoth.-Zeit.*, 1898, 614 from *Bull. gen de Thérap.*) as follows: Liqueur ammon. caust. 40 gtt.; collodii, 3.0 gm.; acidi salicylici, 0.3 gm. A few drops of this solution are applied to the place where the sting has occurred.

✓ QUEBRACHO.

BY FREDERICK L. LEWTON.

The word "Quebracho," contracted from the Spanish *quebrachacha*, signifying "axe-breaker," is applied in South and Central America to a number of trees possessing a very hard wood, but which belong to widely distinct genera.

The natives mark these distinctions by some prominent characteristic, as for instance the color of the wood, whence the names, "quebracho blanco," "quebracho colorado," "moreno," "prieto," "negro," etc.

There are but two of these which have reached commercial importance: Quebracho blanco, botanically known as *Aspidosperma quebracho-blanco* Schlechtendal, belonging to the order *Apocynaceæ*; and Quebracho colorado, the name applied by the natives to two species of *Schinopsis*, belonging to the order *Anacardiaceæ*.

The first named is found in the Argentine Republic. Its wood is of a light yellow color, of great hardness and durability, and is used in that country for various purposes. The bark, sold under the name of "Quebracho bark," contains several alkaloids of medicinal value as well as tannin. It is used in the treatment of asthma and in the tanning industries.

The medicinal properties of Quebracho blanco have been known for some years but it is of much less commercial importance than the Quebracho colorado.

The latter name is applied in the western part of the Argentine Republic, and a part of Chile to *Schinopsis Lorentzii* (Griseb.) Engler, while in Paraguay and the eastern and southern parts of Argentine, *Schinopsis Balansæ* Engler receives the same name.

The wood of these trees is of a dark cherry color, and takes a most beautiful polish. It is unsurpassed for durability either in air or water, and fence-posts made from only a small stick of it will last a lifetime. Furniture made from Quebracho wood is exceedingly handsome.

But by far the most important use of this wood is as a tanning agent. As the entire log is ground up into a coarse sawdust and thus used, its economic value is much greater than other tanning materials where only the bark of the tree furnishes the desired principle.

While the wood of Quebracho colorado contains from 25 to 28

per cent. of tannin, about 10 per cent. more than is contained in the best sumac leaves, it is mostly used at the present time in the form of extract.

There are large works for producing the extract near Hamburg, Frankfort and in other parts of Germany.

Quebracho extract is manufactured in two forms: A soft paste containing about 45 per cent. of tannin, and a solid extract, called "crystal," containing from 60 to 65 per cent. tannin. The latter resembles kino in appearance and in some of its properties.

About twenty-five years ago tanners in Europe began to experiment with Quebracho, and since that time its use has steadily grown. The consumption of it in the last five years, especially, has increased at an astonishing rate.

✓
CRYSTALS OF SODIUM CHLORIDE IN FLUID EXTRACT
OF YERBA REUMA AND A PROXIMATE
ANALYSIS OF THIS PLANT.

BY LYMAN F. KEBLER.

A few months ago, Mr. Charles Durnin, who has charge of the fluid extract department of Smith, Kline and French Company, brought me a handful of crystals, with the statement that he had found them in a fluid extract of Yerba Reuma. Crystals in a fluid extract! This is, to say the least, very unusual. On inquiry it was found that the fluid extract was about fifteen years old and considerable of the menstruum had evaporated.

The crystals were cubical, some of them nearly perfect, but amber in color. The form suggested common salt at once, and a taste of one of the crystals left no doubt about its being salt. It was at first thought that possibly a menstruum containing salt had been used in preparing the fluid extract, but a subsequent analysis of the plant dispelled this idea.

Frankenia grandifolia, Cham. and Schlecht., nat. order Frankeniaceæ, is the scientific name for the plant commonly known as *Yerba Reuma*, or *Salt Grass*. The latter name is also a common one for *Bryzopyrum spicatum*. Yerba Reuma grows near the seashore from San Francisco to San Diego and southward; in the deserts of Arizona, Texas and Southern Nevada.

Prof. J. U. Lloyd¹ called attention to this plant twenty years ago. The saltiness and the undesirable name, Yerba Reuma, were commented on. Dr. J. Moeller² made an histological examination of this plant four years later, but a chemical analysis is wanting.

Medicinally, the leaves and the stems of Yerba Reuma are used as an astringent stimulant application for catarrhal affections.

The above information led me to make a proximate analysis of the plant. Dragendorff's scheme was followed, in the main. The article of commerce was worked with in this investigation.

A microscopical examination of the powdered material revealed the presence of occasional cubical crystals.

Moisture at 115° C. amounted to 9.92 per cent. All of the subsequent results are based on material dried at 115° C.

The amount of chlorides was estimated by macerating a given amount of the dry material in a definite volume of water, decolorizing an aliquot part with nitric acid and boiling, and the chlorides precipitated by means of a silver nitrate solution, the precipitate, washed, dried, etc., in the usual way. This gave me 17.75 per cent. of chloride, calculated as sodium chloride. I was not prepared to accept this result, so a given weight of the drug was exhausted with warm water and the chlorides estimated as above. This gave 17.10 per cent. chloride calculated as above, or averaging the two we have 17.42 per cent. A remarkably high per cent. of salt.

By carefully incinerating a given weight, ash to the amount of 26.84 per cent. was obtained. Being aware of the presence of a large amount of sodium chloride in Yerba Reuma, and its volatile nature at high temperatures, I determined the amount of this salt yet present in the ash. This amounted to 9.82 per cent., calculated as sodium chloride. Leaving ash, without chlorides, amounting to 17.02 per cent. On adding to this the total amount of sodium chloride, we have an ash amounting to 34.12 per cent. One of the highest, if not the highest ash of plant life on record.

The ash consisted of sand, sodium chloride, potassium sulphate, magnesium phosphate, calcium sulphate, calcium oxide, iron oxide, etc. The above combinations are given as probable.

Some selected material yielded: Sodium chloride, 12.54 per cent.; ash, with chlorides, 23.04 per cent. Moisture, 10.93 per

¹ 1878, *AM. JOUR. PHAR.*, 50, 601; *Proc. Am. Phar. Assoc.*, 26, 707.

² 1882, *Pharm. Centralhalle*, 23, 97; *AM. JOUR. PHAR.*, 54, 514.

cent. at 115° C. These data are sufficient to show that the article of commerce varies materially.

The remaining results will be given in condensed form.

Soluble in—	Constituents.	Per Cent.
Petroleum ether . . .	{ Wax, saponifiable	0'72
	{ Fat, chlorophyl, etc.	
	{ M. P. of mixture 60° C.	
Ether U.S.P., 1890 . .	{ Wax, saponifiable	1'00
	{ Fat, chlorophyl, etc.	
Alcohol, absolute . . .	{ Tannin	2'92
	{ Extractive	
Water	{ Sodium chloride	17'42
	{ Extractive	
Sodium hydroxide, 0'2 per cent. solution, removed		4'71
Hydrochloric acid, 1 per cent solution, removed		3'66
Ash in extracted plant residue		5'03
Cellulose, lignin and allied substances		34'93
Loss and unestimated		8'43
Total		100'00

The medicinal value of this plant lies in the salt and tannin it contains.

35 POPLAR STREET.

A COMMON ERROR IN RECORDED RESULTS OF
PROXIMATE PLANT ANALYSIS.

By LYMAN F. KEBLER.

I wish to call attention, in this connection, to an error frequently made in recording results of proximate plant analysis. In summing up the results, the percentage of ash is usually added to the per cent. of the other constituents to make up 100 per cent. Some of the ash constituents are soluble in the solvents employed in the course of an analysis. If these soluble constituents are added as ash, they must necessarily be recorded as soluble in certain solvents employed in the analysis, and thus the same substances are recorded twice.

Suppose we take the above analysis of Yerba Reuma and add the ash to the other constituents, and what do we obtain? Not 100 per cent., but 126'41 per cent. An impossibility. This does not allow for any loss of any sort. It is seldom that the error is so much in evidence, yet it is smaller or greater in all plant analysis where the usual method of recording results is adopted.

If an ash must be recorded in the summary, the proper material to estimate it in is the dried residue left after the action of all the solvents employed in course of the analysis. There may not be any ash in some cases, at this point of the analysis.¹

NOTE ON SPECIFIC GRAVITY.

BY T. S. WIEGAND.

It may be thought strange by some that a subject taught so fully in our schools and text-books should be brought before the attention of this meeting, but the common things of every-day life and use are those we should understand and study most carefully, and in this opinion we are supported by the most painstaking scientists and pharmacists of all countries. My attention was drawn to the subject when recently reading one of the most recent and best treatises on pharmacy, by a method of taking the specific gravity of substances lighter than water, as it was there described, credited to Mr. Symonds and published in the *London Pharmaceutical Journal* and *Transactions*, ser. 3d, xix, vol. 1884. As the method is one with which I had long been familiar and was fully explained by the late eminent Dr. Robert Hare, formerly professor of chemistry in the University of Pennsylvania, I referred to his treatise upon chemical philosophy, published in 1828, and there found it described fifty-six years before the Mr. Symonds paper appeared in the above-named periodical.

The readiness with which this method may be performed makes it strange that it has not been taught more generally in the text-books. The process is simply to suspend a glass funnel to a scale pan and let it be immersed just below the surface of the water in a vase below the scale pan, after it is immersed bring it to equilibrium, and then thrust the body, the sp. gr. of which is desired under the funnel, then restore the equilibrium and note the weight necessary to effect this, which added to the weight of the light body, is to be divided into the weight of the light substance in air—this will give the sp. gr. of the light body.

[¹ In Dragendorff's *Plant Analysis*, which is the work generally employed as a guide in carrying on the proximate analyses of plants, he states under the alcoholic and aqueous extractions that the weight of ash should be subtracted from the weight of the total residue and the difference reported as the amount of total organic matter for those particular solvents.—EDITOR.]

While discussing the subject of specific gravity it is worth while to allude to the method of taking the sp. gr. of substances soluble in water.

The substance under examination is weighed in air and then in some liquid in which it is insoluble, the loss in this liquid is divided into its weight in air, multiplied by the specific gravity of the liquid used—this method is noted in the fifth edition of *Parrish's Pharmacy*, p. 78, date of 1884, is also the general rule for all substances whether soluble or insoluble in water.

THE CHEMISTRY OF SASSAFRAS.¹

BY DR. CLEMENS KLEBER.

Director of the Laboratories of Fritzsche Bros.

The chemistry of sassafras, so far as it has been elucidated by scientific investigations, consists practically of the chemistry of the essential oils that can be distilled from the various parts of the sassafras tree, for, with the exception of a red matter, termed "Sassafrid," which is formed in fresh sassafras roots when exposed to the air, and which seems to be an oxidation product of some tannin-like matter, no other derivative of the plant has, so far, been the subject of chemical researches.

The well-known article of commerce that is called simply "Oil of Sassafras" is distilled exclusively from the sassafras roots, and chiefly from the bark of the root, though also some oil, apparently of the same composition, can be obtained from the wood of the root. The wood and the bark of the stem contain but traces of oil. On the other hand, there are only a very few drugs that contain so high a percentage of volatile oil as does the bark of sassafras root, which yields not less than 6 to 9 per cent. of it, while from the wood of the root generally less than 1 per cent. is obtained.

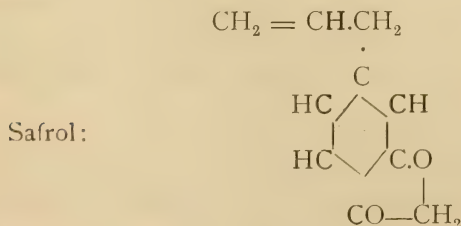
The oil of sassafras bark, when freshly distilled, is an almost colorless liquid; but when exposed to light and air, it gradually assumes a yellow, reddish or even brown color. Its specific gravity is between 1.07 and 1.08, with an optical rotation to the right, varying from plus 3° to plus 4°, the degree of rotation being lower as the specific gravity rises. It may be of interest to mention in this connection that regularly every spring there appear in commerce

¹ Read at a meeting of the College of Pharmacy of the City of New York.

oils which possess abnormal (*i. e.*, too high or too low) specific gravity. Distillers frequently contest the accuracy of the determinations of the specific gravity of their oils with great indignation, for they know that the samples with differing specific gravities were taken from the same tank of oil. The simple explanation for this is, that oil of sassafras consists chiefly of a crystallizable body, safrol, which possesses a specific gravity as high as 1.108; if this body crystallizes from the oil during the cold winter months, it forms, after remelting in warmer weather, a heavy layer at the bottom of the container, which becomes mixed with the bulk of the oil only very slowly. Samples drawn from the top of such a container will, therefore, have a very different specific gravity from that drawn from the bottom of the same vessel. For this reason oil of sassafras should always be well mixed before drawing it off, if it has been exposed to such low temperatures as to crystallize.

If large quantities of oil of sassafras are kept cold for a longer period, safrol will crystallize out in very beautiful, strongly refractory, colorless prisms, which sometimes attain a length of more than 1 foot, and a diameter of 1 inch or more. By repeated treatment in a freezing mixture, with proper fractional distillation of the remaining liquid parts, about 80 per cent. of pure safrol can be isolated from the oil. Pure safrol is an optically inactive, colorless liquid congealing at 8° C., boiling at 232° C., and possesses a pure agreeable sassafras odor.

Its chemical composition is $C_{10}H_{10}O_2$; and, extended chemical study has proven that it is the methylene ether of an allyl-pyrocatechin:



DERIVATIVES OF SASSAFRAS OIL.

If treated with oxidizing agents, it yields, among other products, by oxidation of its allyl to the aldehydic group CHO, a substance that is highly appreciated in perfumery, the well-known piperonal

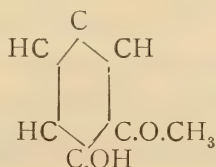
or heliotropine, and by further oxidation piperonylic acid. When safrol is boiled with alcoholic potash, its allyl group, $\text{CH}_2 = \text{CH} \cdot \text{CH}_2$, is transformed into the isomeric propenyl group, $\text{CH}_3\text{CH} = \text{CH}$, thus forming iso-safrol, a substance generally similar to safrol, but of a less agreeable odor, a higher boiling point, 247°C ., higher specific gravity and higher refraction to light. Upon oxidation it also yields piperonal and piperonylic acid, but with considerably greater ease, for which reasons it forms the base for the technical manufacture of heliotropine.

Those parts of sassafras oil which remain liquid even in a freezing mixture, can be separated into their constituents by fractional distillation. In this way a considerable fraction is obtained, boiling between 155° and 175° , which consists chiefly of pinene, $\text{C}_{10}\text{H}_{16}$, that terpene which is found so generally in volatile oils, and which forms the greater part of oil of turpentine. It can easily be identified by its crystalline nitrosochloride and by the easily crystallizable benzylamine and piperidine compounds of the latter. Besides pinene, a small amount of another terpene, $\text{C}_{10}\text{H}_{16}$, is present, which forms a solid, but very unstable addition product with nitrous acid, by which reaction it is recognized as phellandrene, a terpene also very frequently met with in essential oils.

The higher boiling fractions of sassafras oil contain about 0.5 per cent. of a body which can be extracted by means of a diluted solution of alkali. When set free from this solution by sulphuric acid, it forms an oil, which by its clove-like odor and the formation of a benzoyl compound melting at 69°C . can be identified as *eugenol*, the characteristic constituent of oil of cloves. Eugenol $\text{C}_{10}\text{H}_{12}\text{O}_2$, is distinguished from safrol only by possessing two additional atoms of hydrogen in its empirical formula. In its structural composition it is also closely allied to the latter, being the methylic instead of the methylenic ether of the same phenol:



Eugenol:



We therefore are led to suppose that safrol and eugenol are generated in the plant by nearly allied processes.

Those fractions of sassafras oil which boil in the neighborhood of 200°C ., upon cooling yield an abundance of colorless prisms, which, after proper purification, can be recognized as common dextro-camphor $\text{C}_{10}\text{H}_{16}\text{O}$, by their melting-point, odor, optical rotation and the formation of a well crystallizing oxime melting at 115° . In one authentic specimen of sassafras oil as much as 6.8 per cent. of camphor has been found by reduction of the camphor to borneol, $\text{C}_{10}\text{H}_{18}\text{O}$, acetylizing the latter with acetic anhydride, and saponifying a weighed amount of the acetylated oil.

The highest boiling fractions of the oil seem to contain a small amount of a sesquiterpene $\text{C}_{15}\text{H}_{24}$ according to certain color reactions apparently *cadinene*, the presence of which, however, has not yet been proven beyond all doubt.

The composition of oil of sassafras bark may therefore be summarized as follows:

	Per cent.
Safrol, $\text{C}_{10}\text{H}_{10}\text{O}_2$	80
Pinene	} $\text{C}_{10}\text{H}_{16}$ 10
Phellandrene,	
d-Camphor, $\text{C}_{10}\text{H}_{16}\text{O}$	6.8
Eugenol, $\text{C}_{10}\text{H}_{12}\text{O}_2$	0.5
Cadinene, (?) $\text{C}_{15}\text{H}_{24}$, and residue	2.7

Attention might be called to the singular fact that all these compounds contain ten atoms of carbon in the molecule, with the exception of *cadinene*, which has half as many more. It seems also that this circumstance points to an intergenetic relation of these various products of the same plant. Another coincidence which should not pass unnoticed, is, that oil of sassafras bark in its qualitative chemical composition closely resembles oil of camphor, which is, however, not so surprising, seeing that the sassafras and camphor trees belong to the same plant family.

This similarity in composition has been for some time familiar to chemical manufacturers who seized the opportunity for producing substitutes for oil of sassafras from the oily by-products of the manufacture of camphor. As a result, artificial (?) commercial oils of sassafras are nothing else than fractions of Japanese camphor oil, of about the same specific gravity, 1.07, as that of the natural oil. Such substitutes are, for their cheapness, very largely used, especially by soap manufacturers. Pure safrol, which is produced commercially from the same source also finds a considerable use in

chemical industry as well as in medicine. For medicinal purpose safrol is even preferable to oil of sassafras, as it always has a uniform composition and its purity may be easily determined by the usual tests. On the other hand, the natural oil always shows some variation in composition.

OIL OF SASSAFRAS LEAVES.

In addition to the root bark oil, the composition of which we have already considered the sassafras tree also produces another essential oil which does not appear in commerce and which in part seems to have been distilled but once for the purpose of chemical examination, namely the *oil of sassafras leaves*. It is quite well known that sassafras leaves when crushed exhale a rather strong and very agreeable odor. The quantity of oil that can be extracted therefrom by steam distillation, is, however, only very small, amounting to only 0.028 per cent. of the weight of the fresh leaves. The oil has, when fresh, a greenish yellow color, turning to a reddish brown with age; it has a much lower specific gravity, 0.873, than the bark oil, an optical rotation of plus $6^{\circ} 25'$, and a very agreeable odor somewhat resembling oil of lemon and oil of citronella. The characteristic odor is indeed due to the presence of the same aromatic bodies which exist in the latter oils, for chemical examination has proven that the oil contains a considerable amount of citral, $C_{10}H_{16}O$, and geraniol $C_{10}H_{18}O$. Citral, the source of the lemon odor, can be isolated by taking advantage of the fact that it forms a compound with sodium bisulphite; and geraniol, the alcohol from which originates the rose-like odor of the oil of citronella, oil of geranium and oil of roses, may be identified by the formation of a solid compound with calcium chloride. Besides this, another alcohol, isomeric with geraniol, has been isolated, namely linalool. This alcohol is found associated with geraniol, in many essential oils, and, when present either in the free state or as an ester of acetic or of valerianic acid, is the source of the sweet odor of oil of linaloe, oil of lavender and oil of bergamot. Derivatives of these two alcohols are also present in oil of sassafras leaves, in the form of their acetic and valerianic esters. Apart from these highly aromatic principles, the oil also contains several terpenes, namely pinene and phellandrene, considerably more of the latter than is present in the bark oil; there is also, apparently a considerable amount of some hydrocarbon

$C_{10}H_{16}$, which belongs to the "aliphatic terpene" class. These bodies are highly interesting, but so far have not been completely investigated. They are hydrocarbons with an open chain of carbon atoms containing three double bonds, and are characterized by a low specific gravity, high refractive power (compared with ordinary terpenes) and excessive tendency to polymerize. This peculiarity renders their investigation very difficult. It is not unlikely that they form the mother substance of quite a number of other constituents of essential oils. In the highest boiling parts of sassafras leaf oil some cadinene seems to be present, and also a paraffin-like substance melting at 58° C. Such paraffines are often found in oils distilled from leaves, as in oil of Gaultheria and otto of roses; the latter contains so large an amount that the paraffines crystallize out at even a moderate temperature.

Reviewing this enumeration of the chemical constituents of the two oils from sassafras, we find therein a striking and interesting example of the ability of some plants to produce, in their various parts, oils which are fundamentally different in their chemical composition. It would be very desirable if extended researches in this direction could be made with other aromatic plants, as such investigations would probably throw some light upon the question which so far has been found unanswerable: How does the plant produce the great variety of complicated substances, the mixture of which constitutes its essential oils?

THE PHARMACOPŒIAL STANDARD FOR BELLADONNA PLASTER.

BY CARL E. SMITH.

In a recently issued pamphlet published by Johnson & Johnson, entitled "Red Cross Notes," an article appeared treating of Belladonna Plasters, in which was discussed, among other matters, a paper contributed by the writer to the April number of the AMERICAN JOURNAL OF PHARMACY, representing a report on analyses of commercial belladonna plasters, made under the auspices of Research Committee D., Section II., of the Committee of Revision of the U. S. Pharmacopœia.

The statement is made in this pamphlet, that in an attempt to establish a standard for belladonna plasters an error was made by the

Committee as to the pharmacopœial requirements, in that extract of belladonna leaf was mixed with *twice* its weight of plaster mass, instead of mixing it with *four* times its weight of mass, as demanded by the Pharmacopœia. This is based upon the statement in the report above-mentioned, that in order to test the accuracy of the method used for the valuation of the commercial plasters, an assayed extract of belladonna leaf was mixed with twice its weight of a plaster vehicle consisting of rubber, resins, etc., the mixture then being assayed to determine whether or not all alkaloid could be recovered. It will be apparent to any one reading the report attentively, that the mixture was made merely for this purpose, and not, as it is made to appear in the pamphlet of Messrs. Johnson & Johnson, to prepare a typical standard plaster. It would not have been possible to prepare a plaster meeting the implied requirements of the Pharmacopœia from the extract used, by adhering to the proportions directed, since its strength, about 1.15 per cent. of alkaloids, was considerably lower than might reasonably be expected from a leaf extract of average quality. The U. S. Pharmacopœia of 1890 requires the plaster to contain 20 per cent. of extract of belladonna leaf, this standard being approximately the same as that of the U. S. Pharmacopœia of 1880, which demanded that the plaster represent its own weight of belladonna leaf. Since experience has shown the average yield of extract from the leaf, when made with the official menstruum, to be about 22 per cent., the two standards differ but little, and as a specimen of belladonna leaf containing less than 0.3 per cent. of alkaloids is, by general consent, regarded as below the average, a belladonna plaster falling much below this strength must also be regarded as deficient.

No attempt was made by the writer to fix a definite standard of strength in the report referred to, but in commenting on a tabulated list of analyses of commercial plasters included in it, it was stated that a certain number of the samples assayed were much below the U. S. Pharmacopœia standard of strength. As these samples were found to contain from 0.042 to 0.125 per cent. of alkaloids only, no one can with reason object to the characterization of these as being below the implied pharmacopœial requirements.

The writer wishes to take this opportunity to correct any false impression that may possibly have been created in the minds of some of those reading the last paragraph of a note on belladonna

plasters in the June number of this JOURNAL. The paragraph in question referred to the authorship of the method for assaying belladonna plasters, used by the writer in the valuation of commercial plasters reported upon in the April number of this JOURNAL, and there credited to Messrs. S. W. Williams and C. E. Parker, as joint authors. As some readers of the June note may have inferred that Mr. Williams had failed to give credit to Mr. Parker for his share in devising and improving the process, it is due to Mr. Williams to state that both special and general credit was given to Mr. Parker in the original publication of it by Mr. Williams in the *Proc. of the Am. Ph. Ass.* for 1890. The more recent improvements in the method have been made by Mr. Parker.

MEDICO-CHIRURGICAL COLLEGE,
PHILADELPHIA, November, 1898.

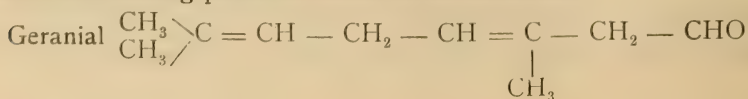
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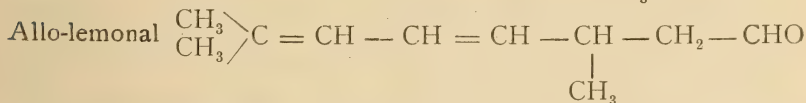
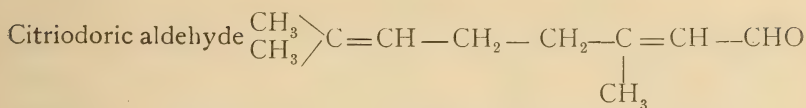
CONSTITUENTS OF OIL OF LEMON GRASS.

W. Stiehl (*Fourn. Prakt. Chemie.*, 1892) reports the results of his investigation of lemon grass oil, the product of *Andropogon citratus*. From this oil, Schimmel & Co. (1888) prepared an aldehyde which they termed citral, and which Semmler (*Berichte* **24**, 201) proved identical with his geranial, isolated from the oil of *Andropogon schoenanthus*. Dodge (*Am. Chem. Jour.*, **12**, 553) isolated by means of sodium bisulphite, an aldehyde which he terms citriodoric aldehyde, and lastly Barbier and Bowvault (*Compt. rend.*, **121**, 1,159) isolated a third aldehyde, which they called l-licarhodal.

These three aldehydes Stiehl has carefully studied. He separates them from the oil by sodium bisulphite, with which they all unite. When sodium hydrate is added to the mixture, geranial separates as a crystalline compound, citriodoric aldehyde dissolves; while l-licorhodal (or allo-lemonal, as Stiehl calls it) separates as oil. The three aldehydes are differentiated by the melting points of their compounds with semi-carbazid and of their naphthocinchonic acid derivatives and by the boiling points of their acetone condensation products.

All three possess the formula $C_{10}H_{16}O$, and are aliphatic bodies with the following probable constitution formulas:





Only the last named is optically active, and this rotates the ray of polarized light to the left.

Geranial cooked with sodium acetate is converted into the two other aldehydes, and these on treatment with dilute acid, go over into geranial.

The existence in the oil of a fourth aldehyde of cedar-like odor and of high boiling point is announced, but no extended work has yet been done.

H. V. ARNY.

AROMATIC WATERS.

E. Ewers reports (*Apoth. Zeitung.*, XIII, 75, 76) an investigation touching the quantitative estimation of volatile oils in aromatic waters. Finding extraction with ether and evaporation of ethereal solution of the oil, either by heat or by passage of air through the container, invariably gave uncertain results, he tried extraction of the oil from 400 c.c. of the water (in which was dissolved 25 per cent. sodium chloride) by agitation with 50 c.c. petroleum ether (B. P. 50°) evaporation of 25 c.c. of the separated benzin solution by passage of air through the container, in which was placed 0.1 to 0.15 gramme olive oil.

The fixed oil, he claims, retains the volatile oil admirably, and his experiments at extraction of aqueous solutions of known strength of volatile oil, even when containing 10 per cent. of alcohol, gave almost quantitative results.

He then estimated the oil strength of three aromatic waters, fennel, peppermint and cinnamon, which he prepared after formula of das "Deutsche Arzneibuch," by distillation of the drug in various stills and under differing conditions; distillation from water alone; from water through which live steam was passed; and lastly, with live steam, no water being mixed with the drug. He also, in the case of fennel and peppermint, prepared waters by rubbing the oil with calcium carbonate and water and subsequent filtration. The result of his assays expressed in grammes to the liter, are:

Fennel . . . 0.188 (from Levant fennel) to 0.4 (Thuringia fennel) normal, 0.3		
Peppermint 0.270	" 0.740	" 0.5
Cinnamon 0.710	" 1.370	" 1.0

Comparisons of method of distillation show the best results are to be expected in waters condensed in a worm rather than in a straight condenser, and from those processes where the drug is mixed with water in the still body, rather than subjected to live steam. Also, finely cut drugs yield a better product than those coarsely comminuted.

Waters prepared from oil and calcium carbonate assayed :

Fennel	0.215 to 0.225 grammes to liter		
Peppermint	0.417 to 0.562	"	" "

H. V. A.

POISONOUS CHARACTER OF PURE WATER.

H. Koeppe (*Apoth. Zeit.*, 1898, 713, from *Deutsche Med. Wochensch*) notes that distilled water is decidedly deleterious to protoplasm, absorbing from the same saline constituents and swelling its tissue, even to the extent of destroying the vitality of the cells.

Distilled water has a similar action on the cells of the stomach, producing in some cases vomiting and catarrhal troubles. After citing Kohlensch's standard of absolute purity of water—the minimum conductivity to an electric current—he shows by this method that many varieties of natural water from melted ice—especially from glaciers—are purer than ordinary commercial distilled water ; as is also the water of a spring at Gastein, which is said to be poisonous and which chemical analysis finds absolutely free from deleterious matter.

He therefore concludes that the toxic properties of this water is due to its absolute purity, which also explains why the sucking of ice and the drinking of glacier water sometimes causes stomach derangement.

H. V. A.

IDENTIFICATION OF THEOBROMINE.

M. Francois (*Four. Pharm. et Chimie*, 1898, 521) gives the following tests of identity and detection of impurities.

0.10 gramme dissolved in a mixture of 1 c.c. nitric acid and 2 c.c. water, becomes cloudy on addition of 10 c.c. solution of silver nitrate (10 per cent.).

It clears on warming and crystallizes on cooling.

A hydrochloric acid solution when treated with bromine water, and the excess of bromine driven off, becomes blue on addition of a trace of ferrous sulphate solution (10 per cent.) and a few drops of ammonia water. Caffeine shows this reaction, however.

Acicular dark green crystals of theobromine tetraiodide are formed when the alkaloid, dissolved in hydrochloric acid, is treated with normal iodine solution, the precipitate separated from the supernatant liquid, redissolved in potassium iodide solution (10 per cent.) and allowed to crystallize.

He gives as the most important test the scant solubility of theobromine in 95 per cent. alcohol. The most saturated alcoholic solution, even after agitation for forty-eight hours at 21° C., contains only 0.0045 grammes in 10 c.c.; while caffeine, the most likely adulterant, will dissolve at 21° C. in proportion of 0.093 gramme to 10 c.c.

This slight alcoholic solubility will detect the presence of almost all other organic adulterants, save starch; such sophistications being usually quite soluble in alcohol. Starch is detected by its insolubility in cold diluted hydrochloric acid; inorganic matter by its ash.

H. V. A.

TESTING SODIUM BICARBONATE.

Skubich (*Apoth. Zeit.*, 1898, 644) reports trials of the various methods of detecting sodium carbonate in the bicarbonate.

He finds Kublis' test—the cloudiness produced when a quinine solution is added to bicarbonate solution, that contains carbonate—is unsatisfactory; as is also Ley's test; the turbidity produced in a solution of bicarbonate containing carbonate.

On the other hand he approves the test of the German Pharmacopœia—the absence of red tint, when phenolphthalein is added to a solution of 1 gramme bicarbonate in 20 c.c. water, to which has been added 0.2 c.c. normal acid.

As precautions, however, he notes that some new glassware is sufficiently alkaline to redden phenolphthalein, and this factor must be eliminated; that temperature affects color, solutions decidedly red at 30° C. being colorless at 0° C.

Taking absolute bicarbonate and adding thereto definite quantities of carbonate solution, he establishes the approximate value of

the test, finding after adding the prescribed amount of normal acid, the red color appears only when over 2 per cent. of carbonate is present; in fact, when the normal acid is omitted, the red color appears only when the amount of carbonate is over 0.5 per cent. This data reckoned for the U.S.P. test shows it permits 1.6 per cent. carbonate.

He further investigated the quantitative estimations of carbonate in bicarbonate, finding unsatisfactory the method based on amount of residue after red heat, absolute bicarbonate yielding 63.1 per cent. of original quantity, and titration of this residue with normal acid and methylorange. Dietze's method was also uncertain; but satisfactory in every respect was Küster's method, which is as follows: To a solution of 1 gramme bicarbonate is added 20 c.c. normal potassium hydrate, part of which is used in converting the bicarbonate into the normal carbonate. To this is added 10 per cent. solution of barium chloride (about 40 c.c.), part of which precipitates as carbonate, while another part reacts with the excess of KOH; an equivalent amount of barium hydrate being formed. This is estimated by titration with normal acid and phenolphthalein, when the quantity of excess potassium hydrate, and therefrom the amount of that reagent used in converting the bicarbonate into carbonate can be deduced; the factor of the latter being 0.084 grammes bicarbonate to each c.c. of normal alkali employed.

In conclusion, he finds commercial bicarbonate usually contains only 1 to 1.5 per cent of normal carbonate.

H. V. A.

PHARMACOLOGICAL NOTES.

THERAPEUTICS OF PODOPHYLLIN.

Dr. Hector W. G. Mackenzie and Dr. Walter E. Dixon (*Edinburgh Med. Jour.* for November, *vide New York Med. Jour.*, December 10th) conclude from their researches that Indian podophyllin (obtained, we suppose, from *Podophyllum Emodi*, Wallich) is an active purgative and a useful therapeutic agent, that it may be substituted for *P. peltatum*; but it is important that the physician should know which sample he is providing, as the Indian variety is nearly twice as physiologically active as the American.

That the active principles contained in the crude resin are two substances:

(a) Crystalline podophyllotoxin.

(b) Podophylloresin (podophyllinic acid?).

Both of which act as excellent laxatives in small doses, without secondary constipation or other objectionable symptoms.

Other authorities (*vide Proceedings Amer. Phar. Asso.*, 1895) do not agree with above, but state it to be unsatisfactory and not an adequate substitute for *P. peltatum*.
C. B. L.

SCOPOLAMINE AND ATROSINE.

Otto Meyer, of Breslau (*Klin. Mon. f. Augenh.*, Jan., 1898), as result of his comparative experiments upon these two drugs in pathological cases states: That 1 per cent. solutions of atrosin acted more strongly in iritis than an atropine solution of the same strength, and two cases of synechia yielded to it which had previously been treated with scopolamin without effect. Both drugs cause an increased tension and slight irritation, and the effect on the accommodation is about the same in both. Occasionally after the use of either drug, slight toxic symptoms, such as vertigo, flushing of the face, disturbance of the pulse-rate, dryness of the fauces and an uncertain action on the accommodation, were noticed. They are practically allied drugs, and under the same conditions in which hyoscyamine is converted into atropine, scopolamine is converted into atrosine.—*Boston Med. and Surg. Jour.*, November 17, 1898. J. L. D. M.

RECOVERY FROM A LARGE DOSE OF HYDROCYANIC ACID.

Kolipinski reports a case of recovery from hydrocyanic acid. A man aged 42, neurotic and melancholic, took, with suicidal intent, $\frac{1}{2}$ ounce of the official *acidum hydrocyanicum dilutum* U.S.P., containing 2 per cent., or 4.8 grains of anhydrous acid. He was found twenty minutes later lying on his bed in a deep coma, etc. The treatment consisted of a subcutaneous injection of $\frac{1}{40}$ grain sulphate of atropine, 10 grains citrate caffeine by enema, and 4 or 5 enemata containing each a teaspoonful of aqua ammoniæ in half a cup of water. Consciousness returned in two hours. In twelve hours he was in his normal condition, outside of dysenteric stools for a few days, the result of the ammonia injections.—*Med. News*, December 10, 1898.
C. B. L.

THE DOSAGE OF BELLADONNA AND NUX VOMICA.

At a meeting of the Manchester Medical Society, Dr. D. J. Leech, one of the most learned of British pharmacologists, related some

investigations to show that accurate dosage with the official preparations of belladonna and nux vomica—the preparations contained in the B.P.—was impossible before the recent revision of the Pharmacopœia. This was due to the fact that however carefully such preparations were made, their strength varied widely, owing to the difference in the amount of alkaloid contained in the drugs in a crude state. The alkaloid contained in the 1885 edition of the British Pharmacopœia varied from $\frac{1}{900}$ to $\frac{1}{75}$ of a grain. In the standardized preparation of the new edition of the British Pharmacopœia, published this year, the width of the limit has been greatly lessened. The largest dose of the new tincture, 15 minims, corresponds to $\frac{1}{150}$ of a grain of the alkaloid, the largest dose of the alcoholic extract to $\frac{1}{100}$.—*Philad. Med. Jour.*, November 28, 1898.

C. B. L

CHLOROFORM POISONING.

D. T. Marshall, M.D. (*Medical News*, November 19, 1898), reports a case of chloroform poisoning, in a woman 40 years of age, from the internal administration of 10 minim doses of chloroform until 40 minims were taken. The patient was found in a semi-unconscious state, but could be aroused to speak incoherently. Her pulse was very slow and irregular, and her respiration slow and sighing, and at times stopping altogether, but starting again after vigorous slapping of the chest. Hypodermic injections of strychnine, digitalis and whiskey in repeated doses were resorted to, the patient receiving in the space of an hour and a half, strychnine sulphate, .22 grains; tincture of digitalis, 9 minims, and whiskey, 4.5 drams. In addition to hypodermic medication, the patient's face and chest were bathed with cold water and the chest was slapped with a wet towel. Artificial respiration by Sylvester's method was resorted to and the feet were bathed in hot water. Later, the faradic current was made use of, applications being made over the chest and heart. Toward the end of an hour the patient showed signs of strychnine poisoning—*risus sardonicus* and spasmodic respiration. These symptoms became very marked, but as the patient again relapsed into unconsciousness, the strychnine injections were repeated. At the end of two hours the effects of the chloroform subsided, the patient making a complete recovery in two days.

J. L. D. M.

EDITORIAL.

PHARMACOLOGY.

In these days, when so much is known concerning the universe, it is impossible for it to be said of anyone as it was said of Milton and Homer by Sydney Smith, that they had mastered all the knowledge of their day. The division of the labor in this storehouse of knowledge among what have been called "specialists" in certain departments has made it apparent that "a jack of all trades must be master of none." It is true that there are few departments which do not share something in common with another and by the association of the workers in many departments with each other some mutual benefits are bound to arise. But this close relationship, which one department shall have with another, must be carried on with discretion if the greatest benefits are to accrue to each. While we ought not to say that we have no interest whatsoever in any department that apparently does not concern us; the interest of the specialist, however, in another department is solely that of a "hobby," or with the hope that a ray of light from this source may illuminate his chosen vocation.

The pharmacist has been so situated that it has been required of him that he should know something of nearly every department. He is supposed to be acquainted with the trades, arts, sciences, ethics, etc. His training and education has been largely with the people of the neighborhood who have come to him for the solution of their daily difficulties. At college, however, his training has been chiefly on the principles required for his calling as a compounder of medicines. The great problem of our educational institutions is how far ought this training along broad lines extend. It is safe to say that it ought to extend so far as to make our knowledge of some value for good and not dangerous.

It ought to startle all of us when we consider the information that is coming to light regarding the making and employment of remedial and other agents in the case of the sick and diseased, how much suffering and even death have probably been caused by reason of ignorance. The therapeutical action of many of our drugs apparently has long been known, but the sciences of pharmacognosy and chemical assay are only now being developed. Pharmaceutical preparations have been made, but out of what and containing what has been a mystery and necessitated the conflicting statements among therapeutists regarding the value of drugs. Do we wonder at this when investigators like Dr. Houghton (*Jour. Amer. Med. Assoc.*, April, 1897) find that "out of twenty-seven samples of crude Indian cannabis, of excellent physical appearance, only thirteen proved to be active when administered to animals; and of a large number of preparations tested, at least one-half were inert. Is it any wonder that physicians believe that hemp is one of the most unreliable of drugs? Or that we occasionally have alarming symptoms following its administration? Digitalis leaves and strophanthus seeds are other good illustrations, and many other good examples might be cited if space permitted."

In the same article Dr. Houghton says: "Without pharmacological knowledge the application of remedies must ever be attended with the greatest uncertainty. As a pure science, pharmacology has taken rapid strides during the past few years; but to the physician, by their dating the manner in which the functions of the various organs of the body may be influenced by the therapeutic agents at his disposal, it has given the greatest gain. Empiricism is

disappearing and ultimately we shall realize the hope of centuries and medicine may justly claim a position among the exact sciences.

"It is not my purpose to show what pharmacology has done in the past, but to call attention to some of the ways in which the science may be of still further service in the future. A physician may be ever so well versed in therapeutics, but if his prescriptions are filled with inert drugs, or drugs varying in strength, his efforts may be useless or even dangerous. In the past the pharmacist has greatly aided in efforts by improving the preparation of the various remedies. But the time will soon come when he should be held responsible not only for the chemical and botanical purity of his preparations, but also for the physiological activity of those important medicinal agents which cannot be standardized by chemical methods."

"Probably to the physician the most important duty of the pharmacologist, in his relation to the manufacturing pharmacist is the examination of the crude drugs and active principles before they are made up into fluid extracts, tinctures, pills, etc. Only these crude drugs and active principles should be tested physiologically which cannot be assayed by chemical means. But there are quite a number of the most important medicinal agents that the chemist must at present pass, without testing, as no characteristic reactions have been worked out for them. Examples will best illustrate this point. As is well known, ergot, the sheet anchor of the obstetrician in so many hours of peril, loses much of its activity in a comparatively short time after being harvested, and if kept under certain conditions may soon become entirely inert, or if the crude drug was good when it came to the manufacturer, the menstruum used may have been such that the more important constituents were left in the improperly exhausted drug; consequently the physician is never quite sure whether the preparation he carries in his obstetric bag can be relied upon to aid him in stimulating an exhausted uterus in a difficult labor, or in checking a much-dreaded post-partum hemorrhage. How much better it is for all concerned to test the ergot physiologically, rejecting the drug if found inert. Then to complete the precautions, the finished product should be again tested to make sure that it shows the active properties manifested by the crude drug."

"It is much more important to the physician that he have a physiologically active preparation than an elegant pharmaceutical preparation. The ideal preparation is the one that possesses the properties of activity and elegance in the highest degree."

Sufficient has been said to indicate that whatever the training of the pharmacist may be, the physician shall require of him preparations that have been made with the best skill of the pharmacist with drugs that have been carefully examined by the pharmacognosist and respond to the tests of the chemist or pharmacologist, or both, as the case may be. Everything which appertains to the pharmacology of drugs concerns and interests the progressive pharmacist as well as physician, as the latter will no doubt soon universally demand information in many cases concerning their physiological assay in preference even to their chemical assay, and at least in connection therewith.

Aromatic Principles of Coffee and Tea are not shown by the investigations of Lehman to manifest any physiological action.—*Pharm. Centralk.*, 1898, p. 679.

REVIEWS AND BIBLIOGRAPHICAL NOTICES.

A TEXT-BOOK OF MEDICAL AND PHARMACEUTICAL CHEMISTRY. By Elias H. Bartley, B.S., M.D., Ph.G. Fifth edition, revised and enlarged. P. Blakiston's Son & Co., Philadelphia, 1898.

The contents of this book are divided into five parts. In Part I are presented such fundamental facts in chemical physics as are necessary for a proper understanding of the descriptive parts of the book, and of the theories and uses of thermometers, hydrometers, the spectroscope, medical batteries, etc. Part II is a well-arranged and full treatise on theoretical chemistry. Part III treats of the inorganic chemistry of the most important elements used in medicine. Part IV deals with organic chemistry, poisons and their antidotes, and incompatibilities. Part V is devoted to the consideration of ferments, nutrition, foods and diet, digestion, the examination of milk, gastric contents, vomit, feces, urine, urinary sediments, and other matters of physiological and clinical chemistry. The book also contains an appendix, in which are given the rules for the spelling and pronunciation of chemical terms adopted by the American Association for the Advancement of Science, and, in addition, tables of weights, measures, specific gravities and solubilities. A glossary of uncommon chemical terms and an index complete the volume.

In preparing the present edition the author has revised the text of the fourth edition and rewritten some portions of it, especially the parts on organic chemistry and physiological and clinical chemistry.

The first edition of this book appeared in 1885. It was designed especially as a text-book for medical students during their attendance upon lectures. But since the title now points to a proposed use of the book in another and distinctly different field from that of a guide to the student of medicine, the work comes before us under conditions which necessitate the viewing of it from two different standpoints.

We think the book is a desirable one for the medical student, for it puts in his hands a store of well-selected matter which should be taught in the lectures on chemistry in the medical schools, and which the physician should thoroughly understand before beginning practice. In treating the subjects, the author has kept in mind the exigencies requiring a knowledge of chemical facts which are likely to arise in medical practice, so that throughout the book we find much good advice to the practitioner; notable instances of this are in regard to the treatment of acute poisoning, and the physician's duty in cases of criminal poisoning. In this connection it may not be out of place to say that we would like to see the books on poisons recognize the fact that petroleum benzin is occasionally an accidental or intentional inebriant nowadays, and designate proper antidotes to it. We think the statement, on page 327, to the effect that solutions of volatile oils in alcohol in the proportion of 1 in 5 are termed essences, while those in the proportion of 1 in 50 are called spirits, may perplex the student, since it is not in accordance with the authority of the United States Pharmacopœia, which gives the terms essence and spirit as synonyms; and, beside, none of these official preparations are prepared in the proportions named. And, again, we think the subject of Fowler's solution is dismissed, on page 192, without sufficient consideration of its composition and arsenical strength to afford the student the knowledge he should have of this medicine.

In condensing the subject-matter of Part III for the medical student the author has omitted mention of some processes which are important to the pharmaceutical student. For instance, no mention is made of the official and the other processes used on a large scale for the preparation of solution of hydrogen dioxide, yet a knowledge of such methods is essential to an understanding of the tests of purity given by the United States Pharmacopœia for this substance. The preparation of the so-called colorless tincture of iodine by means of ammonia water is given on page 130, but no reference is made to the use of sodium thiosulphate, which is as frequently employed in making this preparation, in fact, authorized by the National Formulary in conjunction with ammonia water. We believe also that the description of processes is in some cases too abbreviated for the information of the pharmaceutical student, who should be taught to master the mechanical requirements as well as the chemical details of processes; *e.g.*, the description of acidum sulphurosum, United States Pharmacopœia, on page 162, comprises no instruction for the washing of the sulphur dioxide, or its absorption in cold water.

Another defect of the book, in our opinion, is the inconsistency of the atomic weights used; thus, in the case of zinc there are three different numbers employed to represent this value, as shown on pages 86, 270 and 273. The list of atomic weights used in the book is not the one recognized by the United States Pharmacopœia. While we would not use the last, nor any other, authority as a chock to the wheels of progress in deducing the correct atomic weights, not in any other department of investigation, at the same time, we believe the student would be less confused by studying the same numbers for the atomic weights, both when he reads his general chemistry, and when he goes to the laboratory to do the testing of the United States Pharmacopœia, with its official volumetric solutions, the strengths of which are based upon the atomic weights of a certain list.

There is another matter in which the author indulges to some extent, and to which we must call attention. It is the frequent use of the nearest whole number instead of the mixed number, which is supposed to represent the atomic weight of an element. This practice is altogether a too common one among authors of books on chemistry. If teachers and authors actually believe these numbers to be exact values, they should always insist on the use of the fraction, and not take the responsibility of decreasing or increasing them, simply to enable a student to remember the numbers, or to shorten a calculation somewhat. If the student violates his sense of accuracy by altering the atomic weights in the said manner, let it be at his own bidding.

On account of the objections cited against this part of the book, we cannot recommend it as a guide to the pharmaceutical student.

We note a typographical error on page 444, where C is used instead of Ca.

JOSIAH C. PEACOCK.

THE BRITISH AND COLONIAL DRUGGISTS' DIARY, 1899, 44 Bishopsgate Without, London, E.C.

This is the fourteenth annual issue of the British and Colonial Druggists' Diary, and contains matter of permanent utility for reference. Among the new features of this year's edition are a list of "Photographic Formulæ" and an article on "Electricity as a Hobby." The work will serve the purpose of ref-

erence for the pharmacist, where time requires that he have works of this character within his reach.

THE CHEMISTS AND DRUGGISTS' DIARY, 1899. 42 Cannon Street, London, E.C., Melbourne and Sydney, Australia.

The first Diary of the Chemist and Druggist was issued in 1868, which contained many of the features which are in this one. One of the more recently introduced features is the "Buyers' Guide." The longest section of the Diary is a "Commentary and Criticism of the British Pharmacopœia." This is an epitome of the criticisms as well as much new material in this Pharmacopœia, especial attention being given to the manufacture of chemicals, the preparation of galenicals and descriptions of commercial varieties of drugs and how they are imported. The diary is arranged for daily use and is a valuable reference work for the busy pharmacist, who will find the information contained herein both useful and reliable.

PROCEEDINGS OF THE PENNSYLVANIA PHARMACEUTICAL ASSOCIATION. Twenty-first annual meeting held in the Buena Vista Spring Hotel, Franklin County, June 21-24, 1898.



A very full account of the proceedings of this State Association has already been given in this JOURNAL. The work of this Association in scientific and educational, as well as in social matters, leaves nothing to criticise. One of the most interesting features of this meeting was the presentation of a gold medal to Charles A. Heinitz from his friends, commemorating the completion of fifty years' activity in the drug business. A fac-simile of the medal is given above.

SEMI-ANNUAL REPORT OF SCHIMMEL & CO. Leipzig and New York, October, 1898.

This report contains a record of the most important scientific work done on essential oils during the past six months. There are a number of valuable critical notes on recent papers concerning terpenes and essential oils. We will incorporate in the JOURNAL later some of these notes and reviews.

YEAR-BOOK OF PHARMACY. Comprising abstracts of papers relating to pharmacy, materia medica and chemistry, contributed to British and foreign

journals from July 1, 1897, to June 30, 1898. With the transactions of the British Pharmaceutical Conference at the thirty fifth annual meeting, held at Belfast, August, 1898. London: J. A. Churchill. 1898.

The account of the proceedings of thirty-fifth annual meeting of the British Pharmaceutical Conference has already been given in full in the September issue of the JOURNAL. The Year-Book comprises abstracts of papers on pharmacy and related branches as well, mention of new processes, preparations, etc., which have been introduced during the year mentioned. This part of the work includes about 268 pages, and represents a fairly good summary of the work of the year. One feature enhances the value of the book considerably, and that is its publication so soon after the Conference and the close of the year to which the work relates.

COLLEGE OF PHARMACY OF THE CITY OF NEW YORK.

The regular quarterly meeting of the College of Pharmacy of the City of New York, was held in the Lecture Hall of the College on Tuesday evening, October 18th. Caswell A. Mayo, Chairman of the Special Committee on Papers, reported on behalf of that Committee that pursuing the policy outlined by the previous committee, another American drug—sassafras—had been taken up. Dr W. A. Bastedo introduced the subject by his paper upon the botany of the sassafras tree. He dwelt upon the general botanical character of the plant and alluded to the labors of Miss Katherine C. Burnett, in distinguishing between root and bark of sassafras in a powdered condition. The following notes are based upon her report:

In the root bark the cells are large and thin-walled, and filled with starch. Pores are not seen at all. In the powder the cells are much broken up, and the starch grains largely set free. These starch grains are nearly spherical (if subjected to any pressure they become angular) from ten to fifteen microns in diameter and have the hilum a little to one side of the centre. They are rarely single, and are usually found in groups of from two to five. The bast-fibres are few and are generally detached.

In the stem bark the cells are smaller, thick-walled, contain no starch, and generally hold together in patches. Pores are numerous and distinct. There are many bast-fibres, and these are not detached, but are joined to square thick-walled cells. By these differential characters an adulteration of root bark with 10 per cent. of stem bark can be detected.

Clemens Kleber, Director of the Laboratories of Fritzsche Brothers, delivered an address upon the chemistry of sassafras, which is published in full in another part of this JOURNAL (page 27). Following this address, Prof. Geo. C. Diekmann, of the College of Pharmacy, presented some notes upon the pharmacy of the drug, which had mainly to do with the pith and its products.

The chairman, Mr. Mayo, then read the paper by Professor Lloyd, of Cincinnati, on the history of sassafras. The notes collated by Professor Lloyd give a very complete review of the drug in its historical aspects. The chairman concluded the subject by presenting the paper prepared by Mr. Velsor on the commerce in the sassafras bark.

MINUTES OF THE PHARMACEUTICAL MEETING.

PHILADELPHIA, December 20, 1898.

The regular pharmaceutical meeting was held in the Museum of the College, with James T. Shinn in the chair.

The first paper presented was on "Some Observations on Fluid Acetracts in Comparison with Fluid Extracts," by Wm. B. Thompson, which will be published in a later issue of this JOURNAL. After making some general observations on the adoption of new methods and procedures, the author considered the respective merits of alcohol and acetic acid as menstrua and solvents in pharmaceutical operations. One marked feature which he noticed in fluid acettracts was the absence of a certain gravity and density as compared with the corresponding fluid extracts, as also a striking difference in the color of the two classes of liquids. In cases where the density of the fluid acettracts was more pronounced, the odor of the drug appeared to be masked by the acetous odor. To illustrate the subject more fully, some of the individual members of each class were considered as to physical appearance and also therapeutic activity in a few instances.

Some interesting points were brought out in the discussion of this paper, and among those participating in it were Dr. C. B. Lowe, Professor Remington, Mr. Kebler and the chairman. Professor Remington said that he was glad that the use of acetic acid was attracting attention; that he had been experimenting with this solvent for the past twelve years. He did not agree with all the conclusions of the author, but thought that he had been fair in his treatment of the subject. He said, in addition, that it was necessary to make observations, and that the truth was what we want. He himself was somewhat conservative, and he did not believe that acetic acid could take the place of alcohol, but that some drugs could be exhausted with it, and that probably one-half of the official preparations could be made with this solvent. With reference to the solid preparations, the "acettracts," he said that they were sure to be used, as the acid acted as a solvent for the alkaloids; that Mr. F. B. Kilmer had tried acettract of belladonna for making belladonna plaster, and found it to be 20 per cent. stronger than the ordinary, the reason being that probably soluble salts of the alkaloids were formed, and thus it was more effective. The statement was also made that some of the physicians of this city were trying this class of preparations, and that they had obtained distinctly noticeable results. The speaker then referred to the efficiency of acetic acid in exhausting nux vomica (the whole beans being used by Dr. Squibb), and stated in this connection that a large manufacturing firm of this city had been using it for a number of years. Finally he alluded to a recent editorial in *Merck's Report* on "Acetracts vs. Fluid Extracts," and read portions therefrom, which were humorous, to say the least.

Replying to a question by Dr. Lowe, Professor Remington said that glacial acetic acid was an excellent solvent for volatile oils, and that such solutions were being used by candy manufacturers for flavoring their products.

Mr. Kebler referred to the work of Cripps and Paul and Cownley along this line. They found that in an acettract of ipecac, made by reducing it to powder by evaporation, there was a lowering of the percentage of alkaloid to the extent of $\frac{1}{4}$ to $\frac{1}{5}$; while, on the other hand, a powder made with hydrochloric acid lost none by heating.

An interesting communication on "Pharmacopœial Preparations from an Economical Standpoint" was read by Wm. L. Cliffe, in the absence of the author, Chas. H. La Wall. Several questions pertaining to the economical side of pharmacy were taken up by the writer, but the one which is of vital importance and which seems the most difficult to adjust is that of compensation for service rendered. As stated by the author, the opinion seems to prevail among the laity that the pharmacist realizes immense profits on everything he sells. Such an opinion is very far from the truth, however, as shown by the arguments used. In conclusion, the author said that increased requirements for pharmacists should be accompanied by increased remuneration for services rendered, and that no true progress can be made until equilibrium is established in this direction. This paper will appear in a later issue of this JOURNAL.

Those remarking on the subject of this paper were Messrs. Thompson, England and Kebler.

A "Note on Specific Gravity," by Thos. S. Wiegand, was read by Wm. B. Thompson. (See p. 26.)

Mr. Kebler said that in taking specific gravity it is important to observe certain conditions; as, for instance, that of temperature, in order to obtain concordant results; this also applied to other constants.

Having continued his work for the Committee on Revision of the Pharmacopœia, Lyman F. Kebler presented in abstract a paper having the following title: "The Physical and Chemical Properties of Lithium Benzoate and Lithium Salicylate." Some rather interesting results were reported by the author, as well as some important recommendations in regard to testing the above salts, but these will not be dwelt upon here, as the paper will be published in full in a subsequent issue of this JOURNAL.

The following were exhibited: A sample of excellent saffron grown in Lebanon County, Pa., and another of the best commercial saffron offered in this country. These were sent by Jos. L. Lemberger, of Lebanon, for purposes of comparison, the Lebanon County saffron being considered by him to furnish the type for this drug on account of its freedom from contamination.

In reply to a query as to why saffron should be kept moist, Mr. England said that it was probably on account of volatile oil.

Mr. W. S. Weakley, a student of the College, reported the presence of a resin in the stigmas, and it was suggested that the presence of this constituent might contribute toward the effect produced on the eyes of those handling this drug.

Specimens of a species of *Lemna*, or duckweed, which grows in the canals and ditches of Holland, were received from Prof. J. B. Nagelvoort. This species, known as the red *Lemna*, is said to be very abundant there and to have encroached on the territory of *Lemna polyrrhiza*, the most common species. Owing to its color in the fresh state, which is said to vary from the common red brown of Fe_2O_3 to the more reddish tinge of Sb_2S_3 , the ditches have more the appearance of roadways than of waterways.

Mr. Kebler reported that in a consignment of aconite which he recently examined four bails assayed well, while one was found to contain 25 per cent. of tormentilla, specimens of the aconite and of the adulterant being exhibited.

On motion, the meeting adjourned.

FLORENCE YAPLE, *Secretary pro tem.*

* CLASSES *

OF THE

PHILADELPHIA COLLEGE OF PHARMACY,

Seventy-eighth Annual Session, 1898-99.

FIRST YEAR CLASS LIST.

<i>Name.</i>	<i>Place.</i>	<i>State.</i>	<i>Preceptor.</i>
Armstrong, Albert Buchanan,	Chester,	Pa.	A. Stein Buchanan.
Baumeister, George Elmer,	York,	Pa.	B. S. Gilbert.
Beauchamp, Roscoe Franklin,	Baltimore,	Md.	Chris. Petzelt, dec'd.
Beckmeyer, Wm. Fred. Godlop,	York,	Pa.	A. S. Besore.
Bell, Robert Nevens,	Kearney,	Neb.	S. A. D. Henline.
Benner, Fred. James,	Bethlehem,	Pa.	Paul Kempsmith.
Berberich, Joseph Herman,	Stein,	Germany.	James Moffet, Jr.
Bird, Agustin.	Guayama,	Porto Rico.	
Boesch, Theodore, Karl Henry,	York,	Pa.	A. H. Lafean & Bro.
Boltz, Paul Kline,	Philadelphia,	Pa.	Elias K. Boltz.
Boysen, Theophilus Henry,	Egg Harbor,	N. J.	T. H. Boysen.
Brenner, Frederick Arthur,	Kylertown,	Pa.	Lawson C. Funk.
Caldwell, Edison Ray,	Mt. Vernon,	Ohio.	Edward Dever.
Cathie, Frank Leslie,	Chester,	Pa.	Wm. H. Farley.
Clabaugh, Boyd Van Tries,	Altoona,	Pa.	W. H. Irwin.
Collins, Lane Verlenden,	Philadelphia,	Pa.	John P. Frey.
Cone, Earl Hobart,	Batavia,	N. Y.	W. S. & J. J. Patterson.
Converse, Howard Romaino,	Picture Rocks,	Pa.	Moyer Bros.
Corson, Harry Leroy,	Jersey Shore,	Pa.	B. E. Staples.
Crider, William Edward,	Lock Haven,	Pa.	Chas. Leedom.
Davis, Royal Samuel,	Charlestown,	W. Va.	Thomas & Potterfield.
Davis, William Brown.	Edwardsdale,	Pa.	Daniel E. Lewis.
Doan, Chester Clayton,	Philadelphia,	Pa.	Geo. J. Pechin.
Eckels, Paul,	Decatur,	Ill.	Eberly Bros.
Eddy, Roswell Martin,	Philadelphia,	Pa.	Henry C. Eddy.
Eppler, George Theodore,	Philadelphia,	Pa.	E. E. Wilson & Co.
Fegley, Florence Augusta,	Allentown,	Pa.	Dr. Fegley & Bro.
Fegley, John Stauffer,	Allentown,	Pa.	Dr. Fegley & Bro.
Fischer, Adolph Gustav,	Philadelphia,	Pa.	Albert Oelinger.
Fisher, George Calvin,	Lititz,	Pa.	Dr. James C. Brobst.
Fleming, Samuel Clarkson,	York Co.,	Pa.	Chas. A. Eckels.
Foehl, Philip Charles,	Lancaster,	Pa.	J. H. Fies.
Foster, John Van Valzah,	Lewistown,	Pa.	J. P. Rothermel.
Franceschi, Andres,	Porto Rico.		
French, Rolland Hall,	Salem,	Ohio.	Bolger & French.
Garber, Elmer Franklin Weaver,	Mt. Joy,	Pa.	C. A. Eckels.
Gliem, Harry Charles,	Hazleton,	Pa.	McNair & Hoagland.
Graham, Willard,	Philadelphia,	Pa.	Smith, Kline & French Co.
Grove, Harry Ross,	Alexandria,	Pa.	
Harbord, Kittie Walker,	Salem,	Ore.	Daniel J. Fry.
Harding, Joseph Garfield,	New York,	N. Y.	
Harris, Wm. Kuester Garfield,	Altoona,	Pa.	A. F. Shomberg.

<i>Name.</i>	<i>Place.</i>	<i>State.</i>	<i>Preceptor.</i>
Hart, Lawrence Sylvester,	Philadelphia,	Pa.	
Hartung, Edward William,	Philadelphia,	Pa.	R. W. Maris.
Hassinger, Samuel Reed,	Philadelphia,	Pa.	S. E. R. Hassinger.
Haydock, Mabelle,	Philadelphia,	Pa.	Susannah G. Haydock.
Headings, Prestie Milroy,	Reedsville,	Pa.	
Highfield, Herbert Monroe,	Zanesville,	Ohio.	N. B. Adams.
Hild, John Henry,	Philadelphia,	Pa.	Walter S. Rumsey.
Hinski, Oscar Nicholas,	Philadelphia,	Pa.	H. G. Kalmbach.
Hoffert, Charles Edward,	Millersville,	Pa.	Chas. E. Keiler.
Hoffman, Ira Calvin,	Somerset Co.,	Pa.	H. B. Heffley.
Houston, Franklin Paxson,	West Grove,	Pa.	Nellie Baker.
Hubler, Guy Garfield,	Gordon,	Pa.	J. E. Gregory.
Klopp, Edward Jonathan,	Richland,	Pa.	P. M. Ziegler.
Knerr, Charles George,	Allentown,	Pa.	G. W. Shoemaker & Co.
Kraus, O to Lewis,	New Haven,	Conn.	Otto Kraus.
Krieger, Herman Henry,	Uluow,	Austria.	Ira P. Amick.
Leib, Wilbur John,	York,	Pa.	John P. Frey.
Leiby, Howard Edward,	Philadelphia,	Pa.	Frank G. Mumma.
Leshner, Benjamin Porter,	Chambersburg,	Pa.	Andrew Blair & Co.
Levering, John Hartranft,	Norristown,	Pa.	J. C. Life.
Lewis, Fielding Otis,	Hebbardsville,	Ky.	R. M. McFarland.
Liebert, Louis William,	Philadelphia,	Pa.	H. Clapham.
Link, Edward Frederick,	Evansville,	Ind.	H. B. Morse.
Luddy, James Darrah,	Philadelphia,	Pa.	Frank P. Streeper.
Lynch, Hardie,	Salt Lake City,	Utah.	S. W. Scarff.
McAnally, James Joseph,	Philadelphia,	Pa.	
McClintock, George Washington,	Key West,	Fla.	
McClurg, Benjamin Hoffer,	Elizabethtown,	Pa.	A. H. Bolton.
McDermott, Robert Joseph,	Trenton,	N. J.	Dr. Sands.
McFadden, Warren Lester,	Philadelphia,	Pa.	Duble & Cornell.
McHale, James Joseph,	Shenandoah,	Pa.	Paul W. Houck.
McLaughlin, Harry A.,	Philadelphia,	Pa.	N. Richardson.
Macphee, John James,	New Glasgow,	Nova Scotia,	T. D. Macphee.
Mann, Harvey,	Yeagertown,	Pa.	
Matlack, Walter Ball,	Bridgeton,	N. J.	Alfred N. Pierson,
Mauger, Harry Fillman,	Pottstown,	Pa.	J. D. Seiberling.
Michels, Victor Clyde,	Albion,	Ill.	B. F. Michels.
Monaghan, Martin Vincent,	Shenandoah,	Pa.	Paul W. Houck.
Murphey, Edwin Mason,	Macon,	Miss.	T. S. Murphey.
Musser, Guy Musselman,	Witmer,	Pa.	R. W. Cuthbert
Nauss, George Hill,	Steelton,	Pa.	Wm. K. Martz.
Noble, Henry Carty,	Philadelphia,	Pa.	Howard M. Levering.
Otter, Wm. Proudly, Jr.,	Philadelphia,	Pa.	H. B. Weaver.
Penrose, Thomas William,	Philadelphia,	Pa.	F. W. E. Stedem.
Picking, Jacob Sylvester,	Somerset,	Pa.	G. W. Benford.
Pittinger, Charles A.,	Freehold,	N. J.	Edwin G. Bacon.
Pflieger, Adam William,	York,	Pa.	A. L. Ziegler.
Pollins, Harry Geo. Lomison,	Greensburg,	Pa.	
Post, Arthur Edward,	Towanda,	Pa.	F. Elmer Post.
Quick, Harry Lull,	Titusville,	Pa.	E. K. Thompson & Son.
Raser, William Heyl, 2d,	Reading,	Pa.	John B. Raser.
Redcay, Franklin,	Pottsville,	Pa.	C. D. Miller, M.D.
Reinhart, John Quigley,	Shepherdstown,	W. Va.	H. B. Morse.
Reynolds, Clarence Hyatt,	Reynoldsville,	Pa.	S. Reynolds, M.D.
Rhoads, Luther K.,	Reading,	Pa.	Chas. H. Raudenbush.
Richardson, Edward Miller,	Camden,	N. J.	Emma M. Richardson, M.D.
Rinker, William,	Hellertown,	Pa.	T. E. Jacobson.
Rittman, Joseph,	Lock Haven,	Pa.	G. W. Mason.
Roberts, George William,	Philadelphia,	Pa.	Wm. R. Warner & Co.
Rogers, Walter Clyde,	West Chester,	Pa.	F. P. Rogers.

<i>Name.</i>	<i>Place.</i>	<i>State.</i>	<i>Preceptor.</i>
Rolland, Alexander, Jr.,	Philadelphia,	Pa.	G. H. Rolland.
Ryan, Thomas Andrew,	Susquehanna,	Pa.	
Saile, Wendelin.	Wilkesbarre,	Pa.	Thomās Hart.
Sandt, Warren Norwood,	Martins Creek,	Pa.	A. J. Odenwelder.
Saul, Irvin Ellsworth,	Windsor Castle,	Pa.	Jesse W. Pechin.
Schaefer, George,	Philadelphia,	Pa.	J. A. Werckshagen.
Schaffer, Charles Abraham,	Slatington,	Pa.	R. W. Young, M.D.
Schepp, William Frederick,	Wheeling,	W. Va.	George H. Ebeling.
Schmerker, Adolph Alex. Beyer,	Allentown,	Pa.	F. G. Wedemeyer.
Schneider, Emil Sebastian,	Philadelphia,	Pa.	Philip Goll.
Schooley, Joseph Griggs,	Montgomery,	Pa.	J. L. Miller.
Schropp, John Krause Reinoehl,	Lebanon,	Pa.	Chas. H. Blouch.
Scott, Henry William,	Waynesburg,	Pa.	A. E. Brock, M.D.
Shafer, Clarence Eugene,	Altoona,	Pa.	H. L. Stiles.
Shannon, Byron Guest,	Penus Grove,	N. J.	A. C. Schofield.
Shaver, David Oscar,	Altoona,	Pa.	F. L. Akers.
Shenkle, Albert Philip,	Phoenixville,	Pa.	Michael R. Shenkle.
Shields, Percy Way,	West Chester,	Pa.	Wm. A. Pierce.
Shoffner, John Perry,	S. Bethlehem,	Pa.	T. H. Potts, M.D.
Skillman, Lionel Gilliland,	Philadelphia,	Pa.	Shoemaker & Busch.
Slocum, Charles Eben,	Ouray,	Col.	C. C. Stratton.
Sparks, Theodore Burrows,	Burlington,	N. J.	E. R. Sparks.
Spears, Edward Gibson,	Reading,	Pa.	Harry H. Kline.
Sprague, Hugh Boleyn,	Salt Lake City,	Utah.	Druehl & Franken.
Steever, William Forsaith,	Millersburg,	Pa.	Chas. C. Steever.
Stein, Joseph Paul,	Philadelphia,	Pa.	Crumbie Bros.
Stout, Irwin Sylvester,	Obold,	Pa.	George Y. Wood.
Strathie, Alexander John,	Handcross Sussex,	England.	Wm. J. Jenks.
Texter, Charles Henry,	Perkasie,	Pa.	Henry Neamand.
Thomas, Wallace Crouch,	Thomas,	Pa.	M. B. Fretz.
Tingle John Beard,	Dayton,	O.	Edwin M. Boring.
Tyler, Joseph Clark,	Mt. Sterling,	Ky.	D. H. Ross.
Unangst, Stuart Levin,	Butztown,	Pa.	Harvey F. Hess.
Urffer, Samuel,	S. Bethlehem,	Pa.	D. W. H. Sheets.
Van Gilder, Levi,	Petersburg,	N. J.	C. B. McLaughlin.
Watson, Herbert James,	Wilmington,	Del.	H. K. Watson.
Westermayer, John Joseph,	Philadelphia,	Pa.	L. S. A. Stedem.
Wolfer, William Conard,	Philadelphia,	Pa.	Ed. C. Stout.
Wolfinger, John Philip,	Reading,	Pa.	Harry J. Schad.
Ziegler, Charles Harry,	York,	Pa.	Nelson B. Fry.

SECOND YEAR CLASS LIST.

<i>Name.</i>	<i>Place.</i>	<i>State.</i>	<i>Preceptor.</i>
Albright, Allen Enos,	Allentown,	Pa.	Henry Medd, M.D.
Andrews, William Hall.	Woodstown,	N. J.	Geo. M. Andrews.
Austin, Charles Howard,	Woodstown,	N. J.	Theodore Campbell.
Baker, Maineard Leshar,	Cowan,	Pa.	C. W. Albright.
Barker, Laura Alice,	Coalport,	Pa.	G. W. Wood.
Beardsley, Edward John,	Hartford,	Conn.	Chas. A. Rapelye.
Beatty, Arthur William,	St. Louis.	Mo.	H. C. Blair.
Bishop, William H. Pancoast,	Carversville,	Pa.	J. H. Bishop, M.D.
Blew, Joseph Oscar,	Bridgeton,	N. J.	Chas. F. Dare & Son.
Borrowes, George Henry,	Philadelphia,	Pa.	Henry C. Blair.
Bosler, Harry Ellis,	Oleon,	N. Y.	J. C. Welch.
Bowers, Howard Levin,	Easton,	Pa.	H. B. Semple & Son.
Branin, Manlif Lewis,	Millville,	N. J.	C. B. McLaughlin.
Brennan, Edward Vincent,	Plymouth,	Pa.	L. W. Rehbeen.

<i>Name.</i>	<i>Place.</i>	<i>State.</i>	<i>Preceptor.</i>
Brookes, Virginia Cade,	Waelder,	Texas.	Susan Hayhurst, M. D.
Brooks, Walter,	Quarryville,	Pa.	T. M. Rohrer.
Buckman, William Watson,	Newton,	Pa.	Harry Cox.
Burchfield, William Clinton,	Ashland,	Pa.	R. J. Williams.
Carey, Harris May,	Wyoming,	Del.	N. O. Harris.
Cartwright, Sanford Warren,	Fresno,	Cal.	J. Lawson Crowthers.
Casperson, Henry Lyle,	Clayton,	Del.	E. F. Kaempfer.
Connell, Francis Joseph,	Pottstown,	Pa.	Chas. A. Eckels.
Cook, Ernest Fullerton,	Camden,	N. J.	Geo. M. Beringer.
Corson, Thomas Clark,	Philadelphia,	Pa.	W. J. Scott.
Craig, Henry Douglas,	Mauch Chunk,	Pa.	J. W. Smith.
Dentler, Roy W.,	Turbotville,	Pa.	Frank W. Ely.
Desch, Edward Allen,	Fogelsville,	Pa.	C. J. Biddle.
Dietz, Harry Edgar,	Lock Haven,	Pa.	Geo. W. Mason.
Doake, Robert Stewart,	Philadelphia,	Pa.	Theodore Campbell.
Dobson, Leonard Stanton,	Philadelphia,	Pa.	C. L. Dobson.
Dooley, John Joseph,	Plymouth,	Pa.	Geo. J. Durbin.
Dorman, Harry Milton,	Phoenixville,	Pa.	W. A. Dorman.
Doughty, John Thompson,	Millville,	N. J.	J. Addison Eberly.
Duffy, Thomas Anthony,	Carbondale,	Pa.	B. A. Kelly.
Dunn, Edwin Alfred,	Meadville,	Pa.	P. Henry Utech.
Eddy, Eugene Henry,	Lorain,	O.	John H. Folkens.
Edwards, Manly Bruce,	Bloomsburg,	Pa.	Geo. P. Ringler.
Eldridge, William Arthur,	Salem,	N. J.	Frank Luersson.
Eshleman, Ellis Good,	Faggs Manor,	Pa.	C. W. Warrington.
Fabian, Asa,	Ottsville,	Pa.	R. H. Lackey.
Faunce, George Castor,	Philadelphia,	Pa.	T. W. Hargreaves.
Fiet, John Jacob,	Philadelphia,	Pa.	H. J. Fiet, M. D.
Fisher, John Anthony,	Tremont,	Pa.	J. H. Shultz.
Fox, Harry Terry,	Zanesville,	O. Wm.	M. Chappelle & Sons.
Franko, Louis,	Johnstown,	Pa.	C. G. Campbell.
Garritt, Henry James,	Huron,	O.	J. M. Garritt.
Gibble, John Harry,	Manheim,	Pa.	Elmer E. Gibble, M. D.
Goodyear, Harry Jacob,	Lebanon,	Pa.	J. L. Lemberger.
Greenberg, Jacob,	Novomirgorod,	Russia.	M. Peissakovitch.
Griest, Joseph Taylor,	Peoria,	Ill.	Wm. Benton.
Guest, Wilbert Hillman,	Woodstown,	N. J.	Harry Guest.
Hampson, William Harvey,	Philadelphia.	Pa.	F. F. Drueding.
Hand, Wilson Howe,	Dixon,	Ill.	W. R. McGeorge.
Harmony, Edmund Franklin,	Allentown,	Pa.	
Harrison, Walter B.,	McKeesport,	Pa.	J. C. Smith.
Hauber, Christian Henry,	Philadelphia,	Pa.	F. W. Haussmann.
Heinze, George Elmer,	Ashland,	Pa.	August Schoenenberger.
Hemberger, Paul Edward,	Dayton,	O.	John N. Prass.
Hilbish, John Henry,	Frederickburg,	Pa.	J. C. Greisemer.
Hillebrand, William Gustav,	Philadelphia,	Pa.	Wm. N. Seary.
Hires, Lewis Moore,	Bridgeton,	N. J.	Reed & Fithian.
Holmes, Frederick Cost,	Dover,	Del.	Andrew Blair & Co.
Housholder, Charles Edward,	Harrisburg,	Pa.	Frank S. Keet.
Hughes, Harry Wilbert,	Millville,	N. J.	H. A. Nolte.
Hunsinger, Merton Acto,	North Mehoopany,	Pa.	
Irby, Moreland Russell,	Ashland,	Va.	N. Knight.
Jaeger, William Clark,	Philadelphia,	Pa.	Carl H. Bohn.
Jelliff, Glenn Eli,	Mansfield,	Pa.	W. H. Braddock.
Kazanjan, Rupen Hagop,	Adana,	Armenia.	R. Hambleton, M. D.
Kelly, Edward Jochin,	Philadelphia,	Pa.	L. S. A. Stedem.
Kiefer, William Frederick,	Philadelphia,	Pa.	H. G. Comp & Co.
Kilgus, Harry Edward,	Renovo,	Pa.	Estate of M. L. Clay.
King, Lloyd Stanley,	Dayton,	O.	Wm. P. Graybill.
Landauer, Oscar,	Philadelphia,	Pa.	Theodore Sprissler, M. D.

<i>Name.</i>	<i>Place.</i>	<i>State.</i>	<i>Preceptor.</i>
Lawn, John Thomas,	Philadelphia,	Pa.	F. W. E. Stedem.
Lehman, Samuel William,	Shippensburg,	Pa.	J. C. Altick & Co.
Lum, William Alvin,	North East,	Md.	Francis E. Harrison.
McCaffry, Ward Bolon,	Berkeley Springs,	W. Va.	Thos. E. Hodgson.
McClure, Charles Nevin,	York,	Pa.	L. K. Slifer.
McElwain, William Thomas,	Chambersburg,	Pa.	Chas. W. Keefer.
Mackey, Joseph Quarll,	Avondale,	Pa.	Lawson C. Funk.
Magee, Michael Vincent,	Conshohocken,	Pa.	Thos. F. McCoy.
Maier, Frank Joseph,	Woodbury,	N. J.	Alfred S. Marshall.
Manges, Willis Fastnacht,	Felton,	Pa.	W. H. Gano.
Meredith, Harry Lionel,	Hagerstown,	Md. D. C.	D. C. Aughinbaugh & Son.
Merz, Alfred William,	Wurtenburg,	Germany	E. W. Herrmann.
Meuser, Charles John,	Easton,	Pa.	C. L. Bachmann.
Michael, George Albert,	Lebanon,	Pa.	Chas. E. Boger.
Miles, James Barzillai, Jr.	Helena,	Ark.	
Moeller, Carl Frederick,	Schilleswig Holstein,	Germany,	Dr. Hickman.
Morgan, Lulu Annette,	Scranton,	Pa.	Matthews Brothers.
Morris, William Torrey, 2d,	Penn Yan,	N. Y.	T. F. Wheeler.
Ohliger, Willard,	Wooster,	O.	Zimmerman & Co.
Peiffer, Arthur,	Philadelphia,	Pa.	Steltz & Co.
Pursel, Robert Clayton,	Bloomsburg,	Pa.	Moyer Brothers.
Quinn, Francis Dennis,	Johnsonburg,	Pa.	E. H. Hyatt.
Rectenwald, Daniel Lewis,	Pittsburg,	Pa.	F. W. E. Stedem.
Rhoad, Irwin Bieber,	Kutztown,	Pa.	Funk & Groff.
Richards, Daniel Arthur,	South Easton,	Pa.	A. J. Odenwelder.
Ricketts, Clarence Emerson,	Kane,	Pa.	E. H. Watkins.
Russell, Walter Harold,	Philadelphia,	Pa.	S. Harry Conover.
Ryan, William Thomas,	Honesdale,	Pa.	R. Duane Reed.
Saurman, James S.,	Norristown,	Pa.	Baker & Grady.
Schad, Frank Casper,	Tamaqua,	Pa.	L. J. Steltzer.
Schmidt, Oscar Carl,	Philadelphia,	Pa.	G. A. Barwig.
Scott, John Calvin,	Hamburg,	Pa.	A. J. Fink.
Scott, Levi,	Camden,	Del.	Wilkinson & Wilkinson.
Seabold, Harry Adam	Fahnestock, Annville,	Pa.	W. S. Seabold.
Seip, Charles Louis,	Philadelphia,	Pa.	Geo. H. Ochse.
Settle, Peter Smith,	Philadelphia,	Pa.	T. H. Price, M.D.
Seward, Frank Gates,	Norwich,	N. Y.	Norwich Pharmacal Co.
Siegle, Herman Christian,	Peoria,	Ill.	A. W. H. Reen.
Smiley, Frances Jane,	Philadelphia,	Pa.	Susan Hayhurst, M.D.
Smith, George Carroll,	Pottstown,	Pa.	Eberly Brothers.
Speck, Herbert Arthur,	Bethlehem,	Pa.	Paul Kempsmith.
Stacks, Abraham Homer,	York,	Pa.	J. C. Perry.
Stern, Wilson Clinton Ammon,	Philadelphia,	Pa.	D. Bruce Richards.
Stinson, William Samuel,	Titusville,	Pa.	Geo. B. Evans.
Stolz, Louis,	Syracuse,	N. Y.	G. E. Thorpe.
Stone, Edward Browning,	Camden,	N. J.	Wm. Shafer.
Stout, Benjamin Franklin,	Quakertown,	Pa.	N. S. Steltzer.
Sullivan, James Francis,	Hartington,	Neb.	G. H. West.
Sunday, Carlton Pierce,	York,	Pa.	R. Wm. Ziegler.
Taylor, Lynwood S.,	Spring City,	Pa.	W. Carroll Taylor.
Timmins, Carroll Edwin,	Gettysburg,	Pa.	James Huston.
Toon, John Louis,	Evergreen,	La.	Chas. A. Scribner.
Tucker, Robert Woodliff,	Bermuda Islands,		J. C. Freeman.
Tudley, Harvey Leroy,	Erie,	Pa.	Geo. D. Reavley.
Wenner, Harvey Eugene,	Allentown,	Pa.	A. R. Hesske.
Werts, John Lamont,	Rerovo,	Pa.	J. F. Neely.
Wilkinson, Harry,	Philadelphia,	Pa.	W. H. Milliken.
Williams, Joseph James,	Conshohocken,	Pa.	John W. Pilgrim.
Wilson, George Cookman, Jr.,	Reading,	Pa.	J. C. Sanderson.
Witman, Charles Daniel,	Middletown,	Pa.	J. W. Rewa't.

<i>Name.</i>	<i>Place.</i>	<i>State.</i>	<i>Preceptor.</i>
Witmeyer, Samuel David,	Lebanon,	Pa.	Shinn & Baer.
Young, Alexander, Jr.,	Jenkintown,	Pa.	Samuel C. Henry.
Young, Edwin Henry,	So. Bethlehem,	Pa.	Cyrus Jacoby.
Zeller, Harry Lewis,	Tremont,	Pa.	Russell T. Blackwood.

THIRD YEAR CLASS LIST.

<i>Name.</i>	<i>Place.</i>	<i>State.</i>	<i>Preceptor.</i>
Allen, Milton Deronda,	Medford,	N. J.	D. W. Flemming.
Andrews, Willard Crandall,	Cortland,	Ohio.	W. C. Andrews.
Arnott, William,	Wilmington,	Del.	Joseph P. Williams.
Aughinbaugh, John Keely,	Green Village,	Pa.	Eberly Bros.
Bachman, Herbert Keck,	So. Bethlehem,	Pa.	D. W. Ross.
Ball, Clifford Arthur,	Hellertown,	Pa.	Ellwood Ball, dec'd.
Balliet, Howard Paul,	Bethlehem,	Pa.	D. Geo. Kocher.
Bamford, Melvin William,	Reading,	Pa.	R. Powers Wilkinson.
Bayles, John Wyckoff,	Mt. Holly,	N. J.	A. J. Durand.
Bear, Benjamin Samuel Janney,	Mt. Joy,	Pa.	S. H. Shingle.
Beddow, Llewellyn Jenkins,	Mahanoy City,	Pa.	M. R. Stein.
Blankemeyer, Henry John,	Philadelphia,	Pa.	Kennedy & Burke.
Booth, John Henry,	Philadelphia,	Pa.	Long & Co.
Brookes, Lulu,	Waelder,	Texas, J. M. & J. C. Henderson.	
Buckingham, Harry Sheldon,	Clayton,	N. J.	Howard G. Shinn.
Chalquest, Gustav Emil,	Morristown,	N. J.	E. A. Carrell.
Chamberlain, Lowell Holbrook,	Des Moines,	Iowa.	Irving C. Wood, M.D.
Chamberlin, William Allen,	Indianapolis,	Ind.	Frank Morse.
Clark, John Edward,	Lock Haven,	Pa.	Franciscus & Co.
Cockroft, David Holiday,	Philadelphia,	Pa.	A. S. Hollopeter.
Cohen, John Thomas,	Chester,	Pa.	R. H. Henderson.
Crain, Charles Edward,	Springfield,	Ohio.	G. & S. Coblentz.
Crawford, Horace Victor,	Mifflinburg,	Pa.	E. F. Menger.
Culby, Walter Gibson,	Philadelphia,	Pa.	Breidinger & Comber.
Curtis, Henry,	Minneapolis,	Minn.	Oan J. Thompson, M.D.
Davis, B. K.,	St. Joseph,	Mo.	Muswick & Co.
Davis, Benjamin Winter,	Camden,	N. J.	G. L. Geiger & Co.
Davis, Samuel Bond,	Bridgeton,	N. J.	A. LaDow & Co.
Diehl, George Edward,	Charlestown,	W. Va.	Light & Watson.
Dixon, John Glaspey,	Salem,	N. J.	J. H. Lock, M.D.
Doherty, Harry Aloysius,	Atlantic City,	N. J.	F. Elmer Post.
Donnelly, Clarence Eugene,	Bridgeton,	N. J.	Frederick Seitz, M.D.
Doubler, George Hougen,	Milton,	Pa.	Robert W. Maris.
Downing, William Henry,	Wilmington,	Del.	N. C. Danforth.
Egel, Frederick William,	Bound Brook,	N. J.	Charles L. Manning.
Falkenhainer, Charles, Jr.,	Guttenburg,	Iowa.	James Hervey.
Faulhaber, Gustav Adolph,	Loudenville,	Ohio.	G. Appenzeller.
Fishburne, Richard Levis,	Lock Haven,	Pa.	Andrew Blair & Co.
Fleming, Arthur Bowles,	Chambersburg,	Pa.	J. S. Barnitz.
Gassleiu, Richard Joseph,	Philadelphia,	Pa.	James J. Ottinger.
Grady, William Patrick,	Philadelphia,	Pa.	F. W. E. Stedem.
Gruel, John Edward,	Lancaster,	Pa.	John C. Long, dec'd.
Gryning, John Francis,	Philadelphia,	Pa.	George B. Evans.
Hammond, Nathan Browne,	West Chester,	Pa.	Arthur B. Hammond.
Hance, Howard Ivins,	Philadelphia,	Pa.	R. A. Hance.
Hannum, John Lewis,	Media,	Pa.	Wm E. Dickeson.
Hartman, Henry Loekle,	Lebanon,	Pa.	Dr. Geo. Ross & Co.
Harvey, Charles John,	Butler,	Pa.	D. H. Waller.
Heckman, John George,	Meadville,	Pa.	Lindeman & Heckman.
Heineberg, Alfred,	Selma,	Ala.	Selma Drug Co.

<i>Name.</i>	<i>Place.</i>	<i>State.</i>	<i>Preceptor.</i>
Hesse, Frederick William,	Savannah,	Ga.	Reid & Co.
Hetrick, Harry Leady,	Altoona,	Pa.	W. M. C. Craine.
Heyl, Charles Ambrose,	Philadelphia,	Pa.	P. M. Kelly, M.D.
High, Raymond,	Norristown,	Pa.	H. L. Stiles.
Hill, George Price,	Lansford,	Pa.	Wm. M. Hill.
Hoagland, Robert John,	Peoria,	Ill.	Geo. Holland, M.D.
Hoch, Quintus,	Nazareth,	Pa.	Aquila Hoch.
Holland, Albert James Fowler,	Philadelphia,	Pa.	Geo. Holland, M.D.
Holt, Edwin Merrimon,	Goldsboro,	N. C.	George B. Evans.
Hottenstein, Peter David,	Kutztown,	Pa.	E. J. Sellers.
Huzzard, Kurtz,	Norristown,	Pa.	Eugene Fillman.
Jackson, Charles Henry,	Salem,	N. J.	Harry Lippen.
James, Arthur Bernstein,	Kingstown,	N. Y.	J. Wohlgenuth.
Jenkins, David Evans,	Danville,	Pa.	H. C. Blair.
Kaderly, Eugene John,	New Philadelphia,	Pa.	Opes & Thompson.
Keiser, Frederick Ilick,	Milton,	Pa.	C. Carroll Meyer.
Kemp, Lucien Scott,	Dayton,	O.	Wm. Procter, Jr., Co.
Kimberlin, Frederick William,	Norristown,	Pa.	Chas. B. Ashton.
Kincaid, Raymond Keck,	Allentown,	Pa.	Harvey L. Kieper.
Kintzer, Harry Augustus,	Womelsdorf,	Pa.	F. T. Landis.
Klusmeyer, Harry Chester,	Easton,	Pa.	Fred. L. Mebus.
Koch, Christopher, Jr.,	Philadelphia,	Pa.	C. A. Eckels.
Kraus, Wm. Fred. Constantine,	Philadelphia,	Pa.	Otto Kraus.
Krehl, Benjamin,	Buffalo,	N. Y.	Theo. W. Reuting.
Lacy, Burdett Seldon,	Philadelphia,	Pa.	Wm. E. Lee.
Lauer, Julius Paul,	Scranton,	Pa.	Chas. E. Keeler.
Lehman, George Theodore,	Portsmouth,	O.	Fisher & Streich.
Lock, William,	Philadelphia,	Pa.	James Huston.
Love, Thomas B.,	Philadelphia,	Pa.	Bullock & Crenshaw.
McClintock, Theodore Brown,	Jamestown,	N. Y.	Hatch & Briggs.
McClure, Richard Lewis,	Wilmington,	Del.	F. R. Smith, M.D.
McCollin, James Garrett,	Philadelphia,	Pa.	J. Lawson Crothers.
McDonnell, Joseph Francis,	Centralia,	Pa.	G. W. Davis.
McFall, John Allen,	Charleston,	S. C.	Henry M. Minton.
MacMurray, Annie,	Upland,	Pa.	Wm. H. Farley.
MacPherran, Ivan LeRoy,	Pittsburg,	Pa.	M. M. Dunham.
Mattison, Richard Van S., Jr.,	Ambler,	Pa.	Richard V. Mattison, M.D.
Mervine, Graydon Duncan,	Milton,	Pa.	J. S. Follmer, M.D.
Moury, Joseph Daniel,	Shamokin,	Pa.	L. W. Hensyl, M.D.
Mutty, Walter Clement,	South Brewer,	Maine.	F. W. E. S'edem.
Nicklas, David Edwards,	Chambersburg,	Pa.	John L. Barnitz.
Osterlund, Otto William,	Kinekulle,	Sweden,	Theodore Campbell.
Patrick, William Smith,	Salem,	N. J.	Wm. H. Dunn.
Pflieger, Elwood Keech,	York,	Pa.	Dale, Hart & Co.
Price, Arthur Chew,	Wilmington,	Del.	Joseph C. Roberts.
Radefeld, Robert Hugo,	Philadelphia,	Pa.	Fredk. C. Radefeld.
Ranck, David Walter,	Philadelphia,	Pa.	J. W. Ranck, M.D.
Roessner, Benjamin,	Philadelphia,	Pa.	Decatur Milligan.
Rogers, Edward Bancroft,	Mt. Holly,	N. J.	Elmer D. Prickett.
Ross, Dell Noblet,	Rosemont,	Pa.	Frank W. Prickett.
Rossell, Edward Wood,	Springfield,	N. J.	W. Setgraves.
Ryan, William Stephens,	Philadelphia,	Pa.	A. D. Forrest.
Saylor, Byron Centennial,	Annville,	Pa.	E. C. Warg.
Schwaemmle, Fred. Philip,	Philadelphia,	Pa.	Edward H. Fienhold.
Seitz, John Alphonsus,	Wilmington,	Del.	Z. James Belt.
Seubert, Charles Aloysius,	Lebanon,	Pa.	John F. Loehle.
Shannon, Samuel Coward,	Philadelphia,	Pa.	D. M. Harris.
Shapiro, Henry,	Vitebsk,	Russia.	F. W. E. Stedem.
Sheehan, William Henry,	Dallas City,	Pa.	Harry M. Campbell.
Shirey, Orville Ludwig,	Chambersburg,	Pa.	Cressler & Keefer.

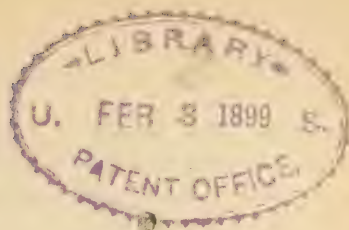
<i>Name.</i>	<i>Place.</i>	<i>State.</i>	<i>Preceptor.</i>
Shoults, Robert Grafton, Ph.G.	Napa,	Cal.	M. Bourgongun.
Sipes, Clarence Leslie,	McConnellsburg,	Pa.	C. P. Landis.
Smith, Arthur Nelson, Ph.G.,	Port Allegany,	Pa.	J. Herbert Williams.
Smith, Chas. Elwood Rupert,	Philadelphia,	Pa.	Shoemaker & Busch.
Snyder, Herman Hugo,	Philadelphia,	Pa.	Frank C. Davis.
Stahlé, Robert Nevin,	Gettysburg,	Pa.	Henry A. Borell.
Stang, Peter,	Philadelphia,	Pa.	Henry Mueller, M.D.
Steel, Chalmers Alexander,	Huntingdon,	Pa.	H. E. Steel.
Stout, Philip Samuel,	Quakertown,	Pa.	O. A. Stout, M.D.
Strode, R. Clark,	Philadelphia,	Pa.	Funk & Groff.
Turner, Joseph Constantine,	Philadelphia,	Pa.	Wm. H. Deibert.
VanDyke, James Wilber,	Hightstown,	N. J.	Harvey G. Rue.
Watson, James Nathaniel,	Elizabethtown,	Pa.	H. C. Blair.
Weakley, William Stair,	York,	Pa.	John J. Weakley.
Wehn, Clyde Edwards,	Johnstown,	Pa.	Charles Young.
West, Katherine Powell,	Norristown,	Pa.	Joseph C. Roberts.
Wiza, Joseph Louis,	Philadelphia,	Pa.	W. H. F. Vandergrift.
Wyckoff, Elmer LeRoy,	Ithaca,	N. Y.	Fred. H. Blackmer.
Young, Annie Hawkins,	Henderson,	N. C.	Geo. B. Evans.
Zeller, Earl Emanuel,	Mifflinburg,	Pa.	James Kleckner.
Ziegler, Chester Winsor,	Gettysburg,	Pa.	Shinn & Baer.

SENIORS.

<i>Name.</i>	<i>Place.</i>	<i>State.</i>	<i>Preceptor.</i>
Becht, Frederick,	Philadelphia,	Pa.	Bullock & Crenshaw.
Entwistle, Albert Henry,	Philadelphia,	Pa.	Chas. H. Roberts.
Failing, W. Clark,	Palatine Bridge,	N. Y.	H. C. Blair.
Filer, Burrett Boynton,	Hammonton,	N. J.	J. Frank Meade, M.D.
Jaeger, Charles Frederick,	Philadelphia,	Pa.	E. E. Bostick.
Jolley, John James,	Philadelphia,	Pa.	Frank M. Apple.
McDonnell, William Joseph,	Philadelphia,	Pa.	Chas. P. McDonnell.
Malin, George Lawrence,	Atlantic City,	N. J.	Willard Wright, dec'd.
Peck, William George,	Nottingham,	England.	J. F. Meade, M.D.
Test, Ellwood Allen,	Philadelphia,	Pa.	John H. Kerr.

SPECIAL STUDENTS.

<i>Name.</i>	<i>Place.</i>	<i>State.</i>	<i>Preceptor.</i>
Chapman, Richard Henry,	Philadelphia,	Pa.	Chemistry.
Crawford, William Harvey,	Ashbourne,	Pa.	Chemistry.
duPont, Ernest,	Wilmington,	Del.	Chemistry.
Eddy, Eugene Henry,	Lorain,	O.	Chemistry.
Hookey, Charles Gilbert,	Philadelphia,	Pa.	Chemistry.
Jaeger, William Clark,	Philadelphia,	Pa.	Chemistry.
Kinzey, Calvin Otto,	Cumberland,	Md.	Chemistry.
McCracken, John Alvin,	Philadelphia,	Pa.	Chemistry.
McMahon, Joseph Alphonsus,	Lock Haven,	Pa.	Chemistry.
Roberts, John Austin,	Wilmington,	Del.	Chemistry.
Stolz, Louis,	Syracuse,	N. Y.	Chemistry.
Suess, Ignatz,	Grand Meseritsch,	Austria.	Chemistry.
Toplis, William G., Ph. G.,	Philadelphia,	Pa.	Chemistry.
Weaver, Christian,	Nastved,	Denmark.	Chemistry.
Wirth, Adam,	New Orleans,	La.	Chemistry.



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THE PHYSICAL AND CHEMICAL PROPERTIES OF LITHIUM BENZOATE AND LITHIUM SALICYLATE.

BY LYMAN F. KEBLER.

Research Committee E, Pharmacopœia Revision.

LITHIUM BENZOATE.

Very little information exists in literature concerning the above chemical, and such as does exist is generally of a pharmaceutical or medicinal character. The U.S.P. contains the best information extant, and is the only pharmacopœia, so far as I know, by which lithium benzoate is recognized.

J. J. Berzelius¹ and C. G. Gmelin were the first to make lithium benzoate. E. B. Shuttleworth² found it soluble in 3.5 parts of water at 60° F., and 2.5 parts at 212° F. Soluble in 10 parts of cold alcohol, sp. gr. 0.838.

As is to be expected, lithium benzoate will contain the associated impurities of both the lithium carbonate and the benzoic acid which enter into its formation. These impurities will influence its physical properties more or less. The purity of lithium carbonate was commented on in a previous paper³, to which the reader is referred.

Benzoic acid is derived from several sources, viz., benzoin, toluol and the urine of herbivorous animals. That prepared from benzoin is expensive and is used for special purposes only. I have met with

¹ Gmelin's *Hand-Book of Chemistry*, translated by H. Watts, 12, 39.

² 1875, *Canadian Pharm. Jour.*, 229; *AM. JOUR. PHARM.*, 47, 113.

³ 1898, *AM. JOUR. PHARM.*, 70, 600.

only one sample of lithium benzoate made with this acid. The ex-toluol acid may contain chlorinated compounds, and the urine-acid is liable to be contaminated with hippuric acid and possess a urine-like odor.

The samples of lithium benzoate examined represent the best goods available in this country. The results are tabulated on the next page.

Only those pharmacopœial requirements will be enumerated here on which it is necessary or seems desirable to make comment, as the result of this investigation.

"Soluble at 15° C. in 4 parts of water, and in 12 parts of alcohol; in 2.5 parts of boiling water and in 10 parts of boiling alcohol. Sodium benzoate increases its solubility in water and diminishes that in alcohol." By comparing the above statements with the results on solubility in the preceding table, it would seem that the samples of lithium benzoate were contaminated with the corresponding sodium salt. An examination, however, showed that such was not the case. This was farther supplemented by making a sample of lithium benzoate from lithium carbonate and benzoic acid of known purity. No. 1 is the sample so prepared.

There certainly are marked differences between the solubilities as given by the U.S.P. and those actually obtained in this investigation.

The solubilities at 15° C. were determined by the digestion method. The solvent was allowed to act for several days, with frequent agitation, on an excess of the chemical at a temperature slightly below 15° C. When the solvent did not appear to take up any more of the salt, the temperature was kept at 15° C. for about four hours, shaken as above, then filtered and the amount of solvent determined in a given weight of the filtrate.

The solubilities in "boiling water" and "boiling alcohol" were determined by estimating the amount of the salt actually dissolved at the boiling point of the saturated solution. This, of course, is much higher than 100° C. for water, or about 78° C. for alcohol. The writer has seen the boiling point of such an aqueous mixture rise up to 140° C. and above, and an alcoholic solution as high as 95° C.

On ignition, a residue of lithium carbonate mixed with carbon is left. It would be more nearly correct to say that the mixture consists of lithium carbonate, carbon and the oxides of lithium.

No.	Physical Appearance.	Microscopical Appearance.	Odor.	Per cent. of Lithium Benzoate, Gravim.	Per cent. of Lithium Benzoate, Volum.	Color of 10 per cent. Solution.	Per cent. of Moisture.	Reaction on Litmus.	Reaction on Phenolphthalein.	SOLUBILITIES.				
										One Part of Salt Required, Parts.				
										Water at 15° C.	Boiling Water.	Alcohol, 95 p. c. at 15° C.	Boiling Alcohol, 95 p. c.	
1	White powder	Amorphous	Benzoin-like	99.89	98.46	Slight tint	1.75	Neutral	Neutral	Alkaline	2.46	19	19.1	16
2	White powder	Some crystals mostly Amorphous	Benzoin-like	99.00	99.00	Slight tint	0.60	Neutral	Neutral	Alkaline	2.56	2	18.9	17
3	White scales	Apparently broken crystals	Balsamic empyreumatic	100.20	97.92	Colorless	8.50 ¹	Neutral	Alkaline	Alkaline	2.56	2	19	16.5
4	White scales	Apparently broken crystals and amorphous	Odorless	99.92	98.00	Colorless	0.90	Neutral	Neutral	Alkaline	2.56	2	19.3	16.5
5	White scales	Apparently broken crystals and amorphous	Odorless	99.81	—	Slight tint	1.00	Neutral	Neutral	Alkaline	2.40	2	19	16.3
6	White powder	Amorphous	Benzoin-like	99.80	97.23	Colorless	1.23	Neutral	Neutral	Alkaline	2.46	2	19	16.4

¹The high percentage of moisture in No. 3 is noteworthy. One-half molecule of water of crystallization corresponds to 6.58 per cent.

I was always of the opinion that lithium benzoate was acid to litmus. Such, however, is not the case. The excess of benzoic acid is probably volatilized with the aqueous vapor, formed during the process of manufacture.

In the Digest of criticisms on the U.S.P., 1890, Part II, p. 102, we find the following: "The addition of a drop of ammonia to the ferric chloride T. S. (fifth paragraph), is necessitated by the *slight acid reaction of the lithium¹ salt.*" Berzelius prepared the basic ferric benzoate as directed by the U.S.P. The reason for adding the ammonia is not apparent. It cannot be to neutralize the acidity of the ferric chloride solution, for, when the basic iron benzoate is formed, hydrochloric acid is liberated, which, in turn, liberates benzoic acid.

The voluminous precipitate formed when a ferric chloride solution is added to an aqueous solution of lithium benzoate or any other neutral soluble benzoate, is but flesh-colored or light brown, rather than brownish-pink.

Under this chemical two sets of tests are given for chlorides and sulphates. One set allows a limit of both impurities, the other set excludes them rigidly. The first set does not add quite enough nitric acid to remove all the benzoic acid, which interferes with the chloride test. In the second set the tests are to be applied to a 5 per cent. aqueous solution, without previous removal of the benzoic acid. The addition of silver nitrate to this solution causes a precipitate of silver benzoate. Barium benzoate is sufficiently soluble, so that the above concentration could be employed in testing for sulphate, but another procedure would be safer.

On adding a slight excess of hydrochloric acid to a 5 per cent. aqueous solution of the salt, a voluminous white precipitate of benzoic acid is formed, which, after being separated by filtration and thoroughly washed and dried, should respond to the tests given under benzoic acid. If to a small portion of the filtrate, a few drops of barium chloride solution are added, not more than a very slight turbidity should result (limit of *sulphate*).

On evaporating the remaining filtrate to *dryness*, 1 part of the residue should be soluble in 5 parts of absolute alcohol, and the addition of an equal volume of ether should not produce a turbidity (limit of *other alkalies*). A 2 per cent. aqueous solution of the

¹ Italics, L. F. K.

above residue should not be affected by the addition of a little sodium cobaltic nitrite solution (limit of *potassium*).

All the other tests, excepting that for chloride, could be applied to this solution, or an aqueous solution of the salt itself could be employed. This solution (1-25) should not be affected by hydrogen sulphide or ammonium oxalate, and should not produce more than a slight coloration with ammonium sulphide.

If 0.5 gramme of the salt is dissolved in 25 c.c. of a mixture, consisting of 10 parts of water and 15 parts of alcohol, then acidulated with nitric acid, the resulting solution should not produce more than a slight opalescence on the addition of a few drops of silver nitrate solution (limit of *chloride*).

The method of ignition and subsequent titration for estimating the per cent. of pure salt, as per the U.S.P., has not given me satisfactory results. The results were non-concordant, and the time required for bringing about complete solution of the ignited residue was all out of proportion to that allotted the ordinary analyst. I have allowed the solvent to act for forty-eight hours, with frequent agitation, and yet, in some cases, solution was incomplete. The ignited residue becomes so hard and adheres so firmly to the porcelain vessel, that it almost appears to form part of the vessel. I tried ignition at higher and lower temperatures, hoping thus to overcome the above difficulty, but without success.

After spending some time and sacrificing a number of porcelain dishes, I happily thought of a method that proved to be very satisfactory. It is as follows: Weigh about 0.5 gramme of the dry lithium benzoate into a platinum capsule, add 2 grammes of pure, *dry*, ammonium sulphate, mix well with a platinum wire and ignite. Apply the flame gradually at first, so as to avoid any possible spurt- ing. The residue is lithium sulphate. From this the amount of pure lithium benzoate can easily be calculated.

One gramme of pure, dry lithium benzoate yields 0.43 of a gramme of lithium sulphate, or the amount of lithium sulphate multiplied by 2.3256 gives the amount of pure lithium benzoate in the sample under examination.

The above method can be readily and quickly applied, and the results are concordant. An estimation can easily be made in twenty minutes. I have made them in ten minutes. As soon as the ammonium sulphate begins to decompose the benzoic acid is liber-

ated from the lithium and appears to volatilize immediately, since only a small portion is carbonized. That the sulphuric acid facilitates the combustion is well known.

If the ammonium sulphate should contain any non-volatile matter, this can be estimated and an allowance made in the calculation. This chemical can easily be prepared pure, from pure ammonium carbonate and pure sulphuric acid. The salt must be thoroughly dried, so as to eliminate all water.

The U.S.P. requires that the dry salt shall be 99.6 per cent. pure. The average of my six determinations is 99.77 per cent. According to these results, the U.S.P. requirement is not too exacting.

LITHIUM SALICYLATE.

Much that has been said of lithium benzoate applies also to lithium salicylate. It must be remembered, however, to keep in mind salicylic instead of benzoic acid. Lithium salicylate is recognized by several pharmacopœias besides the U.S.P., viz.: the *Arzneibuch*, 1895; *Pharmacopœa Helvetica*, 1893, and *Pharmacopœa Norvegica*, 1895.

M. Julliard,¹ a French pharmacist, examined a number of samples of lithium salicylate, and found that those samples which produced permanent colorless solutions were either acid in reaction or contained from 15 to 20 per cent. of sodium salicylate. The samples examined by me were all acid in reaction, but none contained any sodium salt beyond that introduced by the lithium carbonate used in their manufacture. The results of this investigation are embodied in the accompanying table:

¹ 1887, *Bull. Com. June*; Abstr. in *AM. JOUR. PHARM.*, 59, 400.

No.	Physical Appearance.	Microscopical Appearance.	Reaction on Litmus.	Concentrated H ₂ SO ₄ Test.	Moisture at 110° C.
1	White powder.	Semi-crystalline.	Acid.	Slight color.	4'40
2	" "	"	"	" "	4'32
3	Grayish "	"	"	" "	4'50
4	Ashen "	Amorphous.	"	Dark "	3'95
5	Grayish "	"	"	Slight "	4'00

No.	Per Cent. of Lithium Salicylate.	SOLUBLE IN PARTS.			
		Water at 15° C.	Boiling Water.	Alcohol, 95 Per Cent. at 15° C.	Boiling Alcohol, 95 Per Cent.
1	99'56	0'72	0'45	1'63	0'91
2	98'81	0'75	0'46	1'63	0'91
3	100'31	0'84	0'46	1'81	0'92
4	99'09	0'79	0'49	1'70	0'93
5	98'60	0'74	0'44	1'70	0'91

This chemical is deliquescent only in a moist atmosphere.

For products formed by igniting lithium salicylate, see same operation under lithium benzoate.

No. 4 gave a precipitate with copper sulphate solution. This sample will not be considered any farther, for it undoubtedly is an abnormal product. It, however, comes from a good manufacturer.

The method given by the U.S.P. for detecting chlorides is not safe. Lithium chloride decomposes into lithium oxide and hydrochloric acid, when ignited under certain conditions. The fixed alkalies volatilize at high temperatures. Therefore, the test is not safe. Chlorides can be tested for by the procedure outlined above (sulphates cannot, with safety, be tested for in this mixture) under lithium benzoate, for detecting chlorides. The remaining impurities can also be tested for by the directions given there.

The Pharmacopœia requires this chemical to contain 99'13 per cent. of pure lithium salicylate. According to the above results, this is not excessive, and might well be retained. The method of

estimating the purity is the same as that given under lithium benzoate.

One gramme of pure, dry lithium salicylate yields 0.38224 of a gramme of lithium sulphate or the weight of lithium sulphate multiplied by 2.61615 gives the equivalent of lithium salicylate, which, multiplied by 100 and divided by the weight taken, equals the per cent. of pure lithium salicylate.

The ammonium sulphate method for estimating the purity of lithium benzoate or lithium salicylate will be vitiated in proportion to the non-volatile matter present. The limit tests for impurities will, however, reduce this defect to an inappreciable amount.

35 POPLAR STREET, PHILADELPHIA, PA.

PHARMACOPŒIAL PREPARATIONS FROM AN ECONOMICAL STANDPOINT.

BY CHARLES H. LA WALL.

The apothecary, druggist, pharmacist, pharmaceutical chemist, or, whatever you may choose to call the man who keeps "the store with the colored show-globes in the windows," is an individual who makes enormous profits by charging extortionate prices for everything he sells, according to the universal opinion of the laity.

Just when and where this idea originated is involved in obscurity, but, nevertheless, it is accepted as a fact by persons in almost every other line of business.

The agriculturist, who has a horse or cow sick, will unhesitatingly pay a veterinary doctor \$5 or \$10 for his services, but will complain if the druggist charges him 50 cents for the medicine which renders the cure possible.

The pharmacist's education requires just as much time and expense as that of the veterinary, but this fact is ignored, probably because he furnishes something tangible, which the purchaser believes he could get more cheaply, if he could know just what he requires. That is the point which is overlooked, *i. e.*, that the pharmacist has expended his time and money to learn how to compound these various medicaments and all about their properties.

Now, since the educational course in pharmacy is longer in duration and greater in expense entailed; and now that laws are being enacted which require all preparations to conform to certain stand-

ards; we find no corresponding increase in either profits or sales, to restore the equilibrium thus disturbed.

Associations are being formed, of members of the different branches of the drug trade, in order to counteract these acknowledged evils, but no satisfactory way has yet been discovered by which prices may be increased, meanwhile the growing number of pharmacists cuts down the volume of business to a point where many a druggist makes little if any more than his head clerk.

A recent graduate in pharmacy, who had high ideals when he graduated and started in business for himself a few years ago, lately gave the writer some new ideas regarding "pharmaceutical economics."

Some of these views are worthy of consideration, and will be appreciated by many pharmacists whose ideals have suffered by coming into contact with practical realities.

"If a pharmacist makes 1,000 c.c. of any one of the opium preparations of the U.S.P.; and takes 100 c.c. (or 10 per cent.) for assaying the same, in order to make the preparation comply with the standard requirements; how can he sell it in competition with the druggist on the next corner, who makes the same preparation from the 'gum' opium instead of the powder (using the same weight also), and who does not standardize the end product at all?

"The same holds true with regard to preparations of nux vomica.

"If a conscientious pharmacist tests all of the goods which he purchases, how is it possible for him to make up for the loss of material used in testing each substance? This loss is, of course, a fixed quantity, whether the substance is purchased by the ounce or by the pound, thus making the heaviest loss fall upon the purchaser of the smallest quantities, *i. e.*, the pharmacist who has just started in business and is endeavoring to keep down expenses at first.

"That this is no light matter to the pharmacist, whose capital is limited, will be appreciated by glancing over the following list of substances with the approximate amounts used in complying with the U.S.P. tests. This does not include loss of substance in taking Sp. Gr. or B. Pt.:

Æther	40 c.c.
" Acetic	25 c.c.
Alcohol	80 c.c.
" Absolutum	80 c.c.
" Deodoratum	80 c.c.

Aqua Hydrogenii Dioxidi	170 c.c.
Amyl Nitris	10 c.c.
Chloroform	75 c.c.
Extractum Opii	4 grammes.
Opium	10 grammes.
Opii Pulvis	10 grammes
Spiritus Frumenti	200 c.c.
“ Glonoini	20 c.c.
“ Vini Gallici	200 c.c.
Syrupus Acidi Hydriodici	32 grammes.
Vinum Album	80 c.c.
“ Rubrum	150 c.c.

“The rare alkaloids as hydrastine hydrochlorate, hyoscyne hydrobromate, hyoscyamine hydrobromate, and sulphate; physostigmine salicylate, and sulphate, and pilocarpine; also elaterin, gold and sodium chloride, musk, many volatile oils, etc., require certain tests, such as melting point, solubility, boiling point, specific gravity, residue on ignition, and other tests not specifying a definite amount of substance, but, even with strict economy of material the loss in most cases is more than the retail druggist can afford. The retailer buys from a reliable manufacturer who standardizes his galenical preparations and guarantees his goods to conform to the U.S.P. requirements. The expense of analysis to the manufacturer is insignificant in cost of material used, as the following comparison makes clear:

“*A.* The retailer makes 2,000 c.c. tincture opium and takes 100 c.c. for assay (equivalent to 5 per cent.).

“*B.* The manufacturer makes 100 gallons (360,000 c.c.) of the same preparation and takes 200 c.c. for assay (having the advantage of duplicates for correction of possible errors) which is equivalent to about one-twentieth of 1 per cent. The difference is apparent.”

Another suggestion from the same source was not so important, but is given here for what it is worth. “Why are the U.S.P. ointments the only class of preparations where the quantity directed to be prepared is varied according to the costliness or use of the preparation? The same might be done for consistency’s sake with some of the other U.S.P. preparations. For example: 1,000 c.c., the quantity directed for tincture musk, would cost about \$30, and would be sufficient to last for many years in most stores. Trituration of elaterin, 100 grammes, would cost about 10, and would last forever.”

These facts, while not new in themselves, indicate a new way of looking at an old subject, and may bring out points which have hitherto been ignored in considering commercial questions relating to pharmacy.

Increased requirements for pharmacists should be accompanied by increased remuneration for services rendered, and no true progress can be made until equilibrium is established in this direction.

POPLAR AND CANAL STREETS, PHILADELPHIA.

SOME OBSERVATIONS ON FLUID ACETRACTS IN COMPARISON WITH FLUID EXTRACTS.

BY WM. B. THOMPSON.

Where radical change in the method of preparing medicines is advocated or proposed, we cannot be expected to accept any statement of facts, however responsible or authoritative, without some reservation. The theory may be indisputable and the deductions upon which that theory is based incontrovertible, at least in our present state of knowledge, yet when determinate or conclusive evidence is not before us we must insist upon practical demonstration rather than theory. The only crucial test of the therapeutic action of medicines is to be sought in a close clinical observation at the bedside of the patient, the physician present noting with care not only the constitutional effect, but the intermediate effects which precede the final and full impression of the medicine. To what a voluminous extent our medical literature teems with the most positive assertions of authors lauding and vaunting the virtues of some new remedy, when careful inquiry often discloses the fact that for the greater part these recorded observations have been of the most casual character, and the result more frequently attributable to other and auxiliary means rather than to that of the chief instrumentality. So that we had better err on the side of over-caution than to rely upon so serious a venture as experimental medicine at the moment of emergency.

There has been submitted to the trade judgment a class of fluid pharmaceutical preparations to which the term "Acetracts" has been very aptly applied, all these being of an acetous character. The samples which have come under the writer's observation have been subjected only to the test of a casual observation, with such

conclusions as would naturally form in the mind of any pharmacist who has become reasonably familiar with the practice of instituting comparisons—more of a familiar, we may say, than of a technical examination.

The first impression is that there is presented in these fluid “acetracts” a method of procedure and result which completely revolutionizes all former conclusions and absolutely deranges all previous theories as to what constitutes the best general solvent for all those varied, complex constituents of drugs and other medicinal substances; for we are restricted, in preparing “acetracts,” to what is practically an aqueous menstruum. If the original menstruum of our infusions, reinforced with but a small percentage addition of a vegetable acid, will prove a better or an equally good solvent for the alkaloidal and other active constituents of miscellaneous drugs, then all our previous teaching has been at naught, and alcohol, that universal agent of extraction and solution, must be relegated, as far as future uses are concerned, to the anatomical jars of the pathological museum or to a curtailed use in the arts.

Experience and practice extending over an unlimited period of observation in pharmacy has apparently fixed and confirmed the value of alcohol, in varying proportions with aqueous media, as being the true and only known natural solvent for all the useful vegetable matter with which the active medicinal principles are allied in drugs. We are without any intelligent explanation from scientists as to the character of the peculiar property of alcohol and its congeners, the ethers, as a solvent. We must, in our ignorance, conclude that its penetrative and searching quality is *sui generis*. How can we, then, regard any substitution for this distinguishing quality by a purely aqueous menstruum, although slightly acidified, as other than a retrograde step and a partial return to primitive infusions, only saved from an inevitable decomposition by the intervention of an antiseptic vinegar? We are left in doubt as to the precise part, other than that, that the acetic acid can possibly exert in the small percentage additions which are made of it to the exhausting menstrea. Surely it cannot be contended that a 10 per cent. addition of acetic acid to water would be likely to materially increase the solvent power of water. One marked feature in some of the “acetracts” is the absence of a certain gravity and density which is always observable in official and standard

fluid extracts of the proper quality. There is also a very striking difference in the color of the fluids, and the acetracts are not altogether free from the grumous or beclouded appearance. In some specimens of the "acetracts," where the density is more pronounced, the physical characters of the respective drugs of which they are made are not in evidence, for the acetous odor prevails uniformly, of course, and a usual means of identity is thus lost. Now, in regard to what we mean when we use the term strength as applied to acetracts. It is conceivable that, by the method of re-percolation and reservation, a series of first percolates added together would form dense solutions.

But even this physical state would not be a valid argument in the absence of alkaloidal assay, and other test examination, that the full required medical strength resided in a given sample. But we must return to our original proposition as to tests for confirmatory proof that this substituted menstruum will afford as good results as the action of grain spirit.

There has also been advanced, the somewhat ingenious idea that the acid pickles and preserves the alkaloids of active drugs. This may be true, and may be important also as a hint in future procedure. If the acid has a congenial affinity for the basic substance, and can seduce it from its close association and embrace, the active principle might be put in more permanent form in all this class of fluid preparations—not only the adoption of the acetracts into use is attended with some difficulty, but there is a certain familiarity which has become established in regard to the present class of fluid extracts which only a persistent argument and presentation of established fact could remove. This whole subject merits attention and should receive it at the hands of progressive pharmacists—the somewhat more homely garb in which these acetracts are introduced to us should not preclude our forming a close acquaintance with them and if found worthy, adopt them into our permanent friendship.

For the purpose of more forcibly illustrating what we have here said, we may be permitted to state briefly a few observations which were made between the acetracts and fluid extracts.

Cotton Root Bark.—Acetract—A fluid of brown color; thin, light, mobile. Percentage of acetic acid not known. Standard Fluid Ext. Cotton Root Bark made with 75 per cent. alcoholic menstruum is a rich colored red, dense fluid; clear, and of much heavier specific

gravity. This drug has for its chief constituents an acrid resin soluble in 14 parts of alcohol.

Extract Coca.—Acetract—Of brownish, or rather inkish character and grumous state. Its density is due to the large preponderance of aqueous menstruum. A close comparison of sensible properties is prevented by the vinegar which masks the taste. The Standard Fluid Ext. of Coca Leaves is made with 75 per cent. alcoholic menstruum; rich in chlorophyll and natural coloring. The composition is given as residing in a bitter principle, resin, tannin, an aromatic principle, chlorophyll and the alkaloid.

Cascara.—Acetract—Presents a good appearance, shows considerable amount of coloring matter, quite pronounced in taste, although between the natural bitterness and the acetic menstruum it is difficult to recognize. Cascara is readily exhausted with water and might furnish a good type of admissible acetracts. The Standard Fluid Extract has a more highly charged body of vegetable extractive and is quite different in appearance, being more like the Fluid Rhubarb in color and density.

Buchu.—Between these fluids there is a most striking difference. The acetract being a light colored brownish liquid with a much mingled odor; cloudy but without apparent precipitate. Standard Fluid Ext. Buchu is very rich in green coloring matter; clear, bright and most pronounced in characteristic odor; a markedly different liquor in every way. The menstruum of the latter is 95 per cent. alcoholic, the constituents of Buchu, an oil and (stereoptene) camphor.

Digitalis.—The acetic character of this "acetract" would preclude its use in the present official infusion much prescribed. The odor of the acetract is peculiar and does not suggest the drug as does the official preparation. The color is dull brown and black, and not the bright transparency of the official.

Gentian Comp.—This is a type of "acetract" which might be acceptable save for the acetification which can only perform a secondary part in its preparation. The general appetite does not incline to acidity in taste.

Ergot.—This is a type of the class which might appropriately be made as an "acetract" as the drug yields all its virtue readily to water, and the acid addition is of recognized use in permanently fixing the volatile active principle of the drug, but the acetract could not be used hypodermically.

Aconite Root.—The most observable feature in this "acettract" is the exceptionally dark color, the official being of a light wine color and of high alcoholic percentage; no odor of the drug perceptible; only a faint tingling sensation follows its touch upon the tongue. Not so with the official, where this numbness continues for hours.

Belladonna Root.—The "acettract" diluted with water makes a comparatively clear solution, whilst the official fluid when so diluted yields a most copious precipitate. No odor of drug or other contained sensible property exists.

ANALYSIS OF COMMERCIAL VINEGAR.

BY FRANK G. RYAN, PH.G.

This investigation does not present anything new to the commercial analyst; it was however thought of sufficient importance to bring to the attention of this meeting, with a view of illustrating a class of analytical work that may be undertaken by graduates in pharmacy, which would prove both profitable and legitimate employment.

The analyst is called upon frequently, at the present time, for work of this kind, and with the more rigid enforcement of the "pure food and drug laws" by the various States, a new field of employment is undoubtedly being created for the intelligent pharmacist.

In the *Journal of the American Chemical Society*, Vol. XX, 3, Albert W. Smith gives the results of a large number of examinations of cider and spirit vinegar, and other important information connected with the subject, and from which many of the facts here presented have been taken.

Most State laws upon the subject require that cider vinegar shall contain not less than 4 per cent. of absolute acetic acid, and at least 2 per cent. of apple solids, the latter determined by evaporation over boiling water. The substitution, wholly or in part, of spirit vinegar makes an analysis necessary to determine the source of the product, and an examination of the ash has been found to give the best results.

The burning of the solids from cider vinegar is accomplished with considerable difficulty on account of the low temperature at which the mass fuses, enclosing particles of unconsumed carbon.

In spirit vinegar there is no difficulty in reducing the mass to ash. Spirit vinegar yields much less ash than cider vinegar, and the latter differs from the former in containing only traces of sulphates and chlorides, and considerable quantities of alkaline carbonates and phosphates, the phosphates being present in the proportion of two parts of soluble to one part of insoluble phosphates. In samples to which water, containing calcium and magnesium, has been added the amount of soluble phosphates is much reduced, and insoluble phosphates increased. A solution of the soluble ash will show a potassium flame unobscured by sodium light, while samples containing added water will usually show a sodium flame.

In the analysis of vinegar the total solids are determined by evaporating 10 grammes to a constant weight on a water bath. Total acidity is estimated volumetrically with standard alkali, using phenolphthalein as an indicator, 5 grammes of vinegar being first diluted to 50 c.c. with distilled water.

To estimate the ash, 10 grammes are evaporated and burned at a low temperature, the product weighed and the soluble portion removed by washing with water, this solution being tested for sulphates and chlorides, as well as for the color of flame.

For alkalinity of ash, 25 grammes are evaporated and burned, the soluble carbonates and phosphates removed by repeated washing with hot water, and the solution titrated with deci-normal oxalic acid, using methyl-orange as an indicator, and the result expressed in the number of cubic centimetres of acid required for 100 grammes of vinegar. The soluble and insoluble phosphates in the ash from 25 grammes of vinegar being separated, the amount of P_2O_5 in each is determined, Pemberton's method being employed by the writer.

In the following table the result of the examination of three commercial samples is given :

	Specific Gravity 15° C.	Acetic Acid.	Total Solids.	Ash.	No. c.c. Decinormal Acid Required to Neutralize Ash from 100 Grammes of Vinegar.	Milligrammes P ₂ O ₅ in Water Soluble Ash from 100 Grammes Vinegar.	Milli grammes P ₂ O ₅ in Ash not Soluble in Water from 100 Grammes Vinegar.	Total P ₂ O ₅ in Ash from 100 Grammes Vinegar.	Caramel.
Average ¹ pure cider vinegar, 22 samples %. }	—	4.46	2.83	0.39	38.8	19.1	10.1	28.6	—
A	1.0146	4.06	1.95	0.26	30	8	12	20	absent
B	1.015	3.97	2.3	0.087	16	3	10	13	present
C	1.016	3.98	2.4	0.032	8	trace	5	5+	present

¹ Albert K. Smith.

A is undoubtedly cider vinegar, containing added water, as is shown by the small amount of soluble phosphates present.

B is a mixture of cider and spirit vinegar, the amount of ash and soluble and insoluble phosphates being very low, the alkalinity of the ash also being deficient.

C is spirit vinegar with a little cider vinegar added, probably to give it flavor.

THE ASSAY OF EXTRACTUM IPECACUANHÆ LIQUIDUM.¹

BY HAROLD WILSON.

The British Pharmacopœia contains a liquid extract of ipecacuanha, which is standardized to contain not less than 2 and not more than 2.25 grammes of alkaloid in 100 c.c., and an assay process is made official, of which the following is an outline :

Twenty c.c. of the strong liquid extract are diluted with an equal volume of water and the alcohol removed by heating on a water bath ; excess of solution of subacetate of lead is then added, and the liquid filtered off, the precipitate being washed with water and the washings added to the filtrate. This liquid is then freed from lead by precipitation with dilute sulphuric acid and subsequent filtration, the precipitate being washed with water, and the washings added to the filtrate. It is now transferred to a separator,

¹ *Pharmaceutical Journal*, July 2, 1898, p. 3.

excess of solution of ammonia is added, and the alkaloids are removed by shaking with three successive quantities of 25 c.c. chloroform. The mixed chloroformic solutions are evaporated in a tared dish, the residue dried below 80° C., and weighed as total alkaloids.

On trying the above process on a sample of the liquid extract I was struck by its complexity and by the length of time required for its completion. Twenty c.c. of liquid extract required about 7 c.c. of the official solution of subacetate of lead for complete precipitation, and a magma-like mass resulted, which filtered very slowly (taking three to five hours), and which, even after having been washed as thoroughly and carefully as possible, still contained a considerable quantity of alkaloid, as experiments proved.

Two separate assays of 20 c.c. of the liquid extract were made by the official process, 50 c.c. of water being used to wash the precipitate obtained on adding the excess of lead subacetate solution.

No. 1 assay yielded .386 alkaloidal residue.

No. 2 assay yielded .393 alkaloidal residue.

The washed lead precipitates were then examined for alkaloid, as follows:

The precipitate was washed from the filter with water, decomposed with excess of dilute sulphuric acid, and the liquid filtered from the sulphate of lead into a separator. Ten c.c. of ether-chloroform were then added and the mixture agitated; the ether-chloroform was allowed to separate and was then run off and rejected. This treatment was twice repeated. Excess of solution of ammonia was then added, and the precipitated alkaloids removed by agitation with successive quantities of ether-chloroform. The mixed ether-chloroform solutions were evaporated and the residue dried below 80° C. and weighed.

Precipitate from No. 1 assay yielded .031 gramme alkaloidal residue.

Precipitate from No. 2 assay yielded .028 gramme alkaloidal residue.

Not only, therefore, is the official process from the nature of the lead precipitate tedious to perform, but it is inaccurate, since it involves loss of alkaloid.

A number of experiments were then made with the object of devising a simpler, quicker and more accurate method of assay, as a result of which I suggest the following as possessing these advantages:

“Take 20 c.c. of the strong liquid extract, dilute with 20 c.c.

water, place in a porcelain dish and dissipate the alcohol by evaporating the mixture to rather less than half its bulk; allow to cool. Now add 1 c.c. dilute sulphuric acid and transfer to a separator, washing the dish with 20 c.c. water and adding these washings to the liquid in the separator. Add 10 c.c. ether-chloroform (ether and chloroform equal volumes), agitate, warm to promote separation; run off and reject the ether-chloroform layer and twice repeat the treatment with the same quantity of ether-chloroform. Add now 10 c.c. ether-chloroform and excess of solution of ammonia, agitate, warm and run off the separated ether-chloroform layer into a tared dish; agitate with two more similar quantities of ether-chloroform, separate as before, adding these solutions to that in the tared dish. Evaporate the mixed solutions and dry the residue below 80° C. until of constant weight. This weight, less that of the dish, will give the weight of total alkaloids present in the quantity of liquid extract operated on."

It was determined to compare the values of the official and suggested processes by assaying the same sample by both methods, and to ascertain the weight of alkaloid yielded as well as the amount of decinormal acid such weighed residue was capable of neutralizing, thus obtaining a check on the relative amounts of alkaloid present.

Two assays of the same quantity of extract were, therefore, made by the process suggested :

No. 1 assay yielded '417 gramme alkaloidal residue.

No. 2 assay yielded '426 gramme alkaloidal residue.

The foregoing gravimetric results may be summarized thus :

	Alkaloid Extracted.	Lost in Lead Precipitate.	Total.
<i>Official Process—</i>			
No. 1	'386	'031	'417
No. 2	'393	'028	'421
Mean	'389	'029	'419
<i>Suggested Process—</i>			
No. 1	'417	—	'417
No. 2	'426	—	'426
Mean	'421	—	'421

From the above figures it will be seen that when the alkaloid is recovered from the lead precipitate, practically the same quantity of alkaloid by weight is obtained by each process.

The relative alkaloidal value of these residues was then deter-

mined by titration. Owing to the fact that when chloroformic solutions of the alkaloids of ipecacuanha are evaporated the solution rapidly darkens and a colored residue is obtained, it was found necessary to carry out this operation in a very dilute solution, and in order to obtain strictly comparative results exactly the same conditions were observed in every case. Each residue was dissolved in 10 grammes of rectified spirit and diluted with 600 grammes distilled water. Excess of N-10 H_2SO_4 solution was then added, and the mixture titrated back with N-100 NaOH solution, using tincture of cochineal as indicator. The number of cubic centimetres of soda solution required was divided by ten and subtracted from the number of cubic centimetres of acid added, giving the following figures:

Official Method—

No. 1	'386 equal 13'97 c.c. N-10 acid.
No. 2	'393 equal 14'18 c.c. N-10 acid.

Suggested Method—

No. 1	'417 equal 14'88 c.c. N-10 acid.
No. 2	'426 equal 15'24 c.c. N-10 acid.

The residues recovered from the lead precipitate were also titrated.

No. 1	'031 equal 1'02 c.c. N-10 acid.
No. 2	'028 equal 1 c.c. N-10 acid.

From these figures the following calculations can be made, showing that within the limits of experimental error the residue yielded by the suggested process is as rich in alkaloid as that of the official one:

By Official Method from—

No. 1 assay 1 gr. alkaloidal residue equal	36'2 c.c. N-10 acid.
No. 2 assay 1 gr. alkaloidal residue equal	36 c.c. N-10 acid.

By Suggested Method from—

No. 1 assay 1 gr. alkaloidal residue equal	35'7 c.c. N-10 acid.
No. 2 assay 1 gr. alkaloidal residue equal	35'8 c.c. N-10 acid.

As far as can be seen at present, titration appears useless as a means of estimating the alkaloids of ipecacuanha. If we take the molecular weight of emetine (248) and cephaëline (234) as given by Paul and Cownley, and, assuming these alkaloids to be present in about equal quantity, we take the mean of their molecular weights (viz., 241), then every cubic centimetre of N-10 acid used should correspond to .0241 grammes of the mixed alkaloids. If, however,

we calculate the above titration results by this method we see that there is a difference of from 50 to 60 milligrammes between the results of volumetric and gravimetric determinations, e.g.:

Gravimetric.	Volumetric.	Difference.
'386	'337	'049
'393	'342	'051
'417	'359	'058
'426	'367	'059

This difference may be due to some impurity, but more probably to the third alkaloid which is present, and which Paul and Cownley believe to have a much higher molecular weight than either emetine or cephaëline.

By the process suggested, fatty matter, resinous bodies, etc., are removed by agitation with ether-chloroform in acid solution. If this part of the process be carefully conducted it becomes unnecessary to subject the ether-chloroform solution of alkaloids to the usual purification by acid treatment, as when treated by the latter method the ether-chloroform, after shaking with acidulated water, has been proved to yield no residue on evaporation.

The drying of the alkaloidal residue till of constant weight is tedious, but no means can at present be devised for shortening this operation, as cephaëline has been shown by Paul and Cownley to lose weight at 100° C., and hence to guard against this loss the residue must be dried below 80° C.

The advantages claimed for the suggested assay process over that official are the two very important ones of speed and accuracy. The assay can be easily completed, with the exception of drying the residue, well within the time required by the official process for washing the lead precipitate alone. A residue of greater weight is extracted which has been proved by titration to be equally rich in alkaloid. From the mean results given earlier it will be seen that by the official process .389 gramme is extracted and .029 gramme lost, that is to say, the loss is between $\frac{1}{14}$ and $\frac{1}{15}$ of the total alkaloid present. These figures are based on the results obtained on carefully washing the precipitate with 50 c.c. water which, considering the time taken (at least three hours), was judged a fair quantity; but if double that quantity of water be used to wash the precipitate, it has been proved to still contain a notable proportion of alkaloid.

The foregoing experiments have been carried out in the pharmacy laboratory of the Pharmaceutical Society.

CHARLES AUGUSTUS HEINITSH, PH.M., D.Sc.

BY J. H. REDSECKER, PH.M.

Dr. Charles Augustus Heinitsh, one of the oldest, most widely-known and universally esteemed pharmacists in the country, died in Lancaster, Pa., on Thursday afternoon, December 29, 1898, after a brief illness of pneumonia. Mr. Heinitsh took a cold the week preceding his death, but continued to be about his store until Monday afternoon, when he called a physician who found him suffering from pneumonia. He grew rapidly worse until Thursday afternoon, when he passed away.

The family from which Dr. Heinitsh sprang was of Polish-Saxon origin, his great-grandfather, John Frederick Heinitzsch, as the name was originally spelled, being receiver of duties for the King of Saxony. His son, Carl Heinrich Heinitsh, grandfather of Charles A., came to this country in 1772, landing in Philadelphia, from whence he removed to Lancaster and engaged in business. In 1782 he founded the drug business, which is still continued. In 1803 he was succeeded by his son August, who conducted the business until 1816, when he took into partnership his brother, John Frederick Heinitsh. This continued until 1818, when the elder brother retired, and the business was conducted by John Frederick until 1841, when Charles Augustus, the subject of this sketch, became a partner. In 1849 his father retired from business, since which time, a period of almost fifty years, the business was conducted by Charles A., who, for a number of years past, has been assisted by his nephew, Sigmund W. Heinitsh, by whom the business will be continued. Dr. Heinitsh's store was widely and favorably known throughout Lancaster County, and anything bearing his label was accounted to be the best that the market afforded. It also had the great distinction of being the oldest pharmacy in America that has been continuously in the same family and name.

Dr. Heinitsh was born in Lancaster, Pa., where he resided all his life, July 31, 1822, and was, at the time of his death, in the seventy-seventh year of his age. He was educated in the private schools of Lancaster, at the Lititz Academy, under that most distinguished teacher, John Beck, and at the Pennsylvania College, Gettysburg, where he remained until his health failed him, when he was obliged to give up his studies. Returning home, he entered his father's drug store and devoted his attention to acquiring a knowledge of the

business in which, in his subsequent career, he attained pre-eminent distinction. In 1848 he made a tour of Europe with several friends for the purpose of pleasure and as a means of further enlarging his knowledge of things and men. He was not only a skillful and painstaking pharmacist, but having a scientific bent of mind, he took a deep interest in the pursuit of scientific subjects. He was one of the founders of the Linnæan Society of Lancaster, an organi-



CHARLES A. HEINITSH.

zation containing amongst its members some of the most noted scientists of their day, and, at the time of his death, was its oldest charter member. He attended the first meeting of the American Pharmaceutical Association held in Philadelphia in 1851, and in 1882 was elected its president. He also attended the last meeting held in Baltimore in August last, and was specially gratified in meeting his many friends, both old and young. He helped to organize the Pennsylvania Pharmaceutical Association in 1878, and

was its first president, and the only person to whom has ever been accorded the honor of having been twice elected to this office. He was largely instrumental in the organization of the Lancaster County Pharmaceutical Association, and was elected its first president.

While actively engaged in business, requiring much of his time, he nevertheless took a deep interest in everything pertaining to the welfare of the community and the education and elevation of the people. He was school director of his city for a number of years, was a trustee of the State Normal School at Millersville, a member of the Philadelphia College of Pharmacy and an honorary member of its alumni. In March, 1887, the Philadelphia College of Pharmacy conferred on him the honorary degree of Master of Pharmacy, and in 1889 Franklin and Marshall College gave him the degree of Doctor of Science. He enjoyed, in a high degree, the confidence and esteem of the community in which he resided. When the State Medical Society met in Lancaster last spring, he was in attendance as a delegate representing the Pennsylvania Pharmaceutical Association. He was not only accorded a hearty reception, but was specially honored by being escorted to the platform and obliged to take a seat beside the president.

Mr. Heinitch was blessed with a peculiarly affable disposition and cheerful temperament that attracted toward him all with whom he came in contact. He was loved and admired by hosts of friends, attaching them to himself "by hooks of steel" and by whom he was lovingly called "Uncle Charley." He lived continuously in the sunshine, absorbing its rays to the fullest extent, only that he might reflect them in his life; and he was rich in acts of kindness and words and deeds of love, and the world was the better for his having lived in it. "When a man dies," it has been said, "his fellow-men ask what did he leave behind; but the angels ask, what good deeds did he send before?" Dr. Heinitch's cordial greeting, cheering words, helpful inspiration and quiet kindly acts were like a benediction, and are the "good deeds which he sent before." In such love and esteem was he held by his fellow-pharmacists in Pennsylvania, that at their meeting at Buena Vista, last June, they presented him with a gold medal¹ commemorative of his fifty years in business, and expressive of their love and admiration. It came as a complete surprise, but was none the less appreciated.

¹[A *fac-simile* of which was given in the January issue of this JOURNAL.—ED.]

Dr. Heinitsh was married in 1851 to Maria C. Reed, of Lancaster, by whom he is survived. Their married life was a singularly happy one. We may be pardoned for drawing aside the veil of their domestic life only to say that each was devotedly attached to, and solicitous for the welfare of the other, and were happiest when in each other's society. Mrs. Heinitsh has been in feeble health for some years, and it was thought by those who had observed her, that she would have her husband's sustaining arm to the end of her days. But God's ways are not ours, and he has seen fit to order that she shall go on alone attended only by the fragrance of the memory of her loved one. They had four children, three of whom died in infancy, while Charles Augustus, Jr., who was expected to be the hope and comfort of his parents, died some years ago at the age of 16, his death being a blow from which his parents never fully recovered. In memory of him, Dr. Heinitsh sustained a mission in India. Mr. Heinitsh was a member of Trinity Lutheran Church, an active and earnest Christian, rich in deeds of love and mercy, and will be greatly missed in the community.

"See what a grace was seated on his brow!
A combination, and a form, indeed,
Where every god did seem to set his seal,
To give the world assurance of a man."

RECENT LITERATURE RELATING TO PHARMACY.

HYDROCYANIC ACID IN MITCHELLA REPENS.

Richard Fischer (*Pharm. Rev.*, 1898, p. 98) failed to find hydrocyanic acid (which is reported to occur in partidge berry) in specimens examined by him.

REACTION FOR SANTONIN.

Ten to 20 milligrammes of santonin are heated carefully with 2 grammes of concentrated sulphuric acid. To this is added, drop by drop, 2 c.c. of a solution of cerium sulphate (1 per cent.), containing 2 per cent. of sulphuric acid. Cool and dilute with 8 c.c. of water. A reddish-violet precipitate is formed, and the liquid, when clear, divided into three portions: (a) Into one add phenic acid, in excess, the phenol layer is red, the aqueous layer colorless. (b) Into another pour ether and shake it well. The whole remaining colorless. (c) Into a third put some amylic

alcohol; this turns brown and changes to violet upon the addition of phosphorus trichloride.—*Bull. Soc. roy. Pharm. Brux.*, 1898.

ASSAY OF SPIRITUS CAMPHORÆ.

Eschenburg proceeds (*Zeitsch. Allg. Oest. Apoth. Ver.*, 1898, 668) using a medicine as follows: Mix 50 grammes of the spirit of camphor with 200 grammes water, and add 45 grammes benzin (0.716). The solution has a specific gravity of 0.739 at 13°, corresponding to a 10 per cent. solution of camphor in benzine. Substituting petroleum ether the solution had a specific gravity of 0.673 at 15°, showing again an increase of 0.222.

PLANT ASHES.

A useful paper on the percentage of ash in various drugs, published by Hockauf (*Zeitschr. d. allgem. Oest. Apoth.-Vex.*, 1898, p. 49). The following are the results of some of the best-known plants:

	Total.	Insoluble.
Belladonna leaves	10.5 - 15.0	.08 - 2.15
Stramonium	20.3 - 21.3	2.4
Senna	10.0 - 11.4	.4 - 1.8
Indian hemp	13.0 - 14.0	1.73
Santal wood	2.0	—
Pimenta	3.9	.03
Coriander	6.85	1.1
Cascarilla	8.00 - 24.6	.1 - 6.5
Male fern	1.4 - 3.0	.1 - .5
Licorice	3.6	—
Jalap	4.1 - 6.0	.2 - 0.5
Ipecacuanha	2. - 5.3	1.3
Digitalis	7.1 - 10.2	.1 - 1.9
Coca	5.0 - 11.5	.3 - 2.0
Conium	8.0 - 12.0	—
Saffron	5.1 - 6.1	—
Cubebs	5.9 - 8.0	.1 - 0.4
Anise	11.0 - 43.	3.6 - 32.8
Nux vomica	2.0 - 8.40	.5 - 2.0
Cinchona	1.8 - 6.0	.1 - 1.85
Calumba	5.4 - 8.0	.2 - 3.0
Gentian	4.0 - 14.0	—
Belladonna root . . . . .	.3 - 13.7	—
Catechu	2.2 - 5.9	.1 - 1.6

THE CONFERVA AT NERIS-LES-BAINS.

M. P. Carles (*Bull. Soc. Pharm.*, Bordeaux, 1898, 262) describes the handsome cryptogams that grow around the basin of a warm

spring at the above-mentioned health resort. They spring from the ground, are of a brilliant green, and are sometimes 50 cm. high. Some are found floating on the surface of the water in green, viscid, round masses. On decaying they show their albuminoid nature by evolution of hydrogen sulphide and ammonia, as well as forming, on heating, cyanides and ammonium compounds.

Their ash contains iodine, fluorine and silicon—elements found in the surrounding rocks and in the spring water.

As in seaweed, the iodine percentage is much higher than it is in the water in which they float.

For this reason, the plant, which is unctuous to the touch, due to the silicon it contains, has been used as a poultice and used by friction.

The author, after stating that the plant contains 98 per cent. of water, and that desiccation without putrefaction is difficult, recommends its preservation by rapid drying in a current of warm air and powdering.

H. V. ARNY.

ASSAY OF MEDICATED GAUZE.

G. Schacherl read a paper on this subject before the Third International Congress of Applied Chemistry (*Pharm. Post*, 1898, 437). *Iodoform*, he finds, is best estimated by heating the gauze in a pressure flask on a water bath, with solution of sodium alcoholate in alcohol, whereby the iodoform is decomposed and the iodine converted into sodium iodide. The contents of the bottle is poured into a beaker, the gauze washed with water and the washings mixed with the alcoholic liquid, the mixture being heated to concentrate it and to drive off the alcohol.

The cooled, concentrated liquid is mixed with diluted nitric acid (nitrous free), a definite quantity of normal silver nitrate is added and an aliquot part is titrated with decinormal potassium sulphocyanate solution, whereby through the excess of silver nitrate thus formed, the utilized quantity of that reagent can be reckoned; its factor being 0.01309 grammes iodoform for each cubic centimetre decinormal silver nitrate employed. Other methods of assay—even gravimetric estimation as silver iodide—he found unsatisfactory because of evaporation of the volatile iodoform and iodine.

Carbolic acid he assays by Koppeschaar's method, treating the gauze with water at 60° C., withdrawing an aliquot part, which is titrated with decinormal bromine solution.

Salicylic Acid Gauze is readily assayed by extracting the acid with 20–30 per cent. alcohol, concentrating solution and titrating with decinormal alkali and phenolphthalein.

In conclusion, he finds commercial gauzes are of fair strength considering the difficulty of uniform distribution of the medicating agent and the tendency to deterioration by age, due to evaporation or reduction. In view of these difficulties, leniency should be shown slight deficiencies in strength, he suggesting as permissible minimum variation, 10 per cent. of the stated standard. H. V. A.

THE CONSTITUENTS OF KOLA.

C. Schweitzer (*Pharm. Zeit.*, 1898, 380) claims that the nitrogenous compound usually known as kola-red is a mixture, consisting of nitrogen free coloring matter, a nitrogenous glucoside and a ferment.

The latter he separates from the drug by digestion in 20 per cent. alcohol, pouring the filtrate into absolute alcohol when the crude ferment is precipitated. This is collected, dissolved in water and purified by repeated precipitations in absolute alcohol. Its freedom from nitrogen was shown by fusion with sodium, and its diastatic action was shown by conversion of sugar into glucose through its agency.

The glucoside was separated from the residue left on evaporation of the alcoholic extract.

After removing the theobromine, caffeine and sugar by solution in alkaline water and precipitation on neutralization—the process being repeated several times—the final product was a brown amorphous body, which, on treatment with diluted acids, yielded glucose, caffeine and theobromine.

Both caffeine and theobromine are found in kola, and an assay of the theobromine, by addition of decinormal silver nitrate and titration of excess of this reagent with decinormal potassium sulphocyanate, showed the relative amounts of theobromine and caffeine present in the drug to be about 1 to 99; the total alkaloidal strength of the drug being about 0.6 per cent.

The intimate connection of true kola-red, caffeine and glucose to the glucoside suggests as the formula of the latter, a combination of three molecules of glucose, one of kola-red and one of caffeine.

H. V. A.

ASSAY OF IODINE IN THE IODIDES OF BISMUTH.

O. Spindler (*Sddeutsch. Apoth. Zeit.*, 1898, 604) proceeds as follows :

A definite weight of the chemical is placed in a separatory funnel, is shaken with a little water and is treated with a strong solution of ferric chloride, which precipitates the iodine and dissolves the bismuth.

The iodine is shaken out with chloroform, the separated chloroform solution repeatedly washed with water to remove traces of the chlorides of bismuth and iron that may have been carried over (care being used to avoid evaporation of iodine), after which an aqueous solution of potassium iodide is added and the liquid titrated with decinormal hyposulphite solution.

By this method he finds the commercial brick-red bismuth oxyiodide averages 24 per cent. iodine, while the theoretical iodine strength of BiOI is 35.2 per cent.

H. V. A.

TESTS FOR GUM RESINS, RESINS AND BALSAMS.

K. Dieterich presents in the *Pharm. Centralh.*, 1898, Nos. 19, 20 and 21, an extended list of tests for the leading officials of the class mentioned above. The length of articles forbids more than a brief enumeration of their most salient points, and the reader is referred to the original for details.

Ammoniac and *Galbanum*.—Green fluorescence produced, on saturating with ammonia, concentrated hydrochloric acid which has been treated with the gum resins.

Not more than 50 per cent. is insoluble in alcohol. Maximum ash, 10 per cent.

Asafetida and *Euphorbium*.—Not more than 50 per cent. is insoluble in alcohol (U.S.P. for asafetida says 40 per cent.). Maximum ash, 10 per cent.

Tolu.—1 gramme in alcoholic solution titrated with $\frac{1}{10}$ normal alcoholic potassa should require 20 to 28 c.c. of latter for neutralization (corresponding to acid number 112 to 115).

Benzoin.—No odor of bitter almond is developed on heating with permanganate solution. Not more than 1 per cent. insoluble in alcohol.

Resin.—1 gramme dissolved in 25 c.c. $\frac{1}{2}$ normal alcoholic potassa

should require on titration 18.6–19.3 c.c. $\frac{1}{2}$ normal sulphuric acid (corresponding to acid number 160 to 180).

Myrrh.—Not more than 70 per cent. insoluble in alcohol. Maximum ash, 10 per cent. Etheral solution of alcoholic extract turns red and violet with bromine vapors.

Damar.—1 gramme mixed with 50 c.c. benzin, 10 c.c. $\frac{1}{2}$ normal alcoholic potassa and 10 c.c. $\frac{1}{2}$ normal aqueous potassa, after standing twenty-four hours, should require for neutralization 19 to 19.3 c.c. $\frac{1}{2}$ normal sulphuric acid (corresponding to acid number 20 to 30).

Storax.—Not more than 2.5 per cent. insoluble in alcohol. Not less than 70 per cent. should remain on evaporation of alcoholic solution (as in U.S.P.). Not more than 30 per cent. volatile. There should be no ash.

Turpentine.—10 grammes turpentine P. G. (which is semi-fluid) should solidify on addition of 2 grammes finely-powdered slaked lime.

H. V. A.

EXAMINATION OF HYDRASTIS.

Schmidt (*Ph. Zeit.*, 1898, 339) has assayed golden seal to decide relative merits of rhizome and rootlets. He found rhizome and rootlets yielded 19.25 per cent. extract and 2.69 per cent. hydrastin; the rhizome alone 22.75 per cent. and 2.75 per cent. respectively, and the rootlets alone 15.50 per cent. and 1.2 per cent. H. V. A.

THE FLOWERS OF DATURA ALBA.

This plant, closely allied to our official stramonium, is largely cultivated in Germany, by reason of its handsome flowers, which, unlike our species, are very fragrant. Hesse (*Pharm. Zeit.*, 1898, 340) states that in China and India, the habitat of the plant, it is used medicinally and for illegal purposes. He lends force to this statement by extraction of hyosceine in considerable quantities.

H. V. A.

CONSTITUENTS OF SENEGA.

A careful investigation of senega is reported by Jos. Kain (*Ph. Post*, 1898, 329, 341). He states the sugar of senega is chiefly saccharose (as shown by H. J. Schroeder, A. J. P., April, 1896), and finds, besides senegin and polygalic acid, a lævogyre glucoside, which hydrolyses to two bodies—insoluble in water and not closely examined—and a dextrogyre sugar. As the new glucoside was first

extracted by precipitation from infusion with lead acetate—a method admitting possibility of the substance being a decomposition product and not a constituent of the fresh root—he disarmed criticism by employing an elaborate method of extraction, limiting the agents to alcohol and ether and the temperature to 40° C. This method also yielded the glucoside, which, differing from the other constituents of senega, is soluble in absolute alcohol and ether.

H. V. A.

COCAINE AND CHERRY LAUREL WATER.

C. Glücksmann (*Ph. Rundschau*, 1898, 473) opposes the statement of L. Declin, that cocaine hydrochlorate is incompatible with genuine cherry laurel water, while soluble in a water made from hydrocyanic acid, suggesting the alkaloid as a test for the spurious water. He states that the pharmacopœial cocaine salt will make a clear solution (even 5 per cent.) with cherry laurel water, which shows on standing, no greater change than does a distilled water solution.

H. V. A.

TOXICOLOGICAL EXAMINATIONS FOR ALKALOIDS.

The investigations of Hulsebosch, on alkaloidal assays of extracts, by means of Smetham's extraction apparatus, suggested to J. A. Mjoen (*Apoth. Zeit.*, 1898, 591) an application in toxicological work and that with much success.

The method consists in extracting the food (milk, beer, meat) or the organs (stomach contents, decayed flesh, etc.) with alcohol and tartaric acid, solution of the evaporated extraction in water, and treatment of this with ether or chloroform in the extraction apparatus in a manner similar to the extraction of fat in the Soxhlet's apparatus.

This extraction removes fat and coloring matter which drops into the flask, wherein the ether is heated. When all the fat is removed the acid solution is made alkaline and extraction continued with a new supply of ether in a new flask. The free alkaloid is now dissolved and flows into the flask in which it can be weighed. The method is applicable to most poisonous bitter principles (like picrotoxin) as well as to alkaloids. For application to morphine, chloroform must be the solvent.

H. V. A.

ACONITE IN TORMENTILLA.

A fatal case of poisoning is reported (*Ph. Zeit.*, 1898, 339) from Buda Pesth, caused by administration of Tormentilla mixed with

aconite—an occurrence without excuse, since the appearance of the two drugs is markedly different.

H. V. A.

A PTOMAIN RESEMBLING STRYCHNINE.

Mecke and Wimmer (*Pharm. Zeit.*, 1898, 300), in a toxicological examination of a decomposing corpse, extracted a principle which gave with picric acid, potassium bichromate and potassium sulphocyanate, the same reactions as strychnine. It differed from the latter, however, in its reactions with Froehde's Reagent (producing a dirty green color) sulphuric acid (yellow to cherry red) and Erdmann's Reagent (yellow), none of which affect strychnine. It is also scarcely bitter and, injected into a frog, produced no toxic effect. It is evidently a ptomaine, and not the one reported by Amthor (*Bericht, bayerischer Vertr. angewant. Chemie*, 1887), differing from this in its behavior with sulphuric acid and potassium bichromate.

H. V. A.

THE UNITED STATES PHARMACOPŒIA.

The "Proceedings of the Missouri Pharm. Assoc., for 1898," gives a report through G. H. Chas. Klie, M.D., Chairman of the Committee, of the efforts made to obtain the opinions of the medical profession concerning the revision of the next Pharmacopœia. A circular letter (which we have not room to quote) was sent out to 1,500 physicians, accompanied by a postal card which contained ten questions printed on it with sufficient blank space to answer yes or no. Of the 1,500 cards sent out, 311, or 20.6 per cent. were returned with all or more or less of the questions answered; 207 of these had signatures; 104 had none.

Question No. 1.—"The United States Pharmacopœia, is it your standard?" was answered by 300 affirmatively; 277 answering "Yes," others saying "Partly," "Yes, to a certain extent," "Yes, as far as it goes," "Yes, if I have any." One says, "No, the general and lamentable incompetency of average country druggists forces doctors to ready-made remedies." Another says: "Prefer German," etc., etc.

Question No. 2.—"Do you recommend changes?" brought a total of 153 answers; affirmative, 85; negative, 49; non-committal, 19; no answers, 158. Some say, "Yes, all latest," "In keeping with the times, yes," "Revision right up to date," "Give maximum and minimum doses, also frequency of dosage," "Let well enough alone."

Question No. 2 *a*, "Additions?"—The total number of answers was 94; affirmative, 81; negative, 131; no answers, 217. Additions suggested were, in part: "Antipyrin, phenacetin, antitoxin, acetanilid," "Alkaloids and active principles," "Tuberculin and antitoxin," "Palatable fluid extract of cascara and also palatable preparations for disguising quinine and preparations," "All new remedies that are good," "Compel all druggists to dispense from one formula," etc., etc.

Question No. 2 *b*, "Omissions?"—The total number of answers was 61; affirmative, 28; negative, 31; non-committal, 3; no answers, 250. Of the 27 affirmative answers, 6 say, "Yes," "Leave out the metric system," "Lard," "Tinctures from all except gum resins and iron," "All tinctures of which there are fluid extracts," etc., etc.

To question No. 2 *c*.—"Changes in formulæ or manipulations?" etc., total number of answers was 59; affirmative, 23; negative, 20; non-committal, 6; no answers, 252. Some say: "All should be metric;" "Make remedies more palatable;" "Use no foreign terms," etc., etc.

To question 4.—"Shall the United States Pharmacopœia give Maximum Doses?" the total number of answers, was 291; affirmative, 264; negative, 23; non-committal, 4; no answers, 20.

To question 5.—"Do you Prescribe Proprietary Remedies?" the total number of answers was 294; affirmative, 178; negative, 116; non-committal, 2; no answers, 15. Some say: "Some coal tar combination," "Those that are prepared especially for the medical profession," "Rarely, and am ashamed each time I have prescribed them," "They are only fit for lazy physicians and quacks."

Question No. 6.—"If so, Why?" 147 give their reasons for doing so; 29 give "convenience" as their reason; 33 "elegance, superiority, palatability, usefulness, discovery, placebo," etc.; 41 give as reasons: "Good results, satisfactory, eligible, necessary, supply a long-felt want," etc. Others say: "Because their appearance is less repulsive than when prepared by pharmacists," "Right manufacturing is expensive, and druggists cannot do it," etc., etc.

To question No. 9.—"Shall fermented and distilled liquors be dismissed from the United States Pharmacopœia?" 67 answer affirmatively, 220 negatively.

To question No. 10.—"Are you in favor of introducing the metric system in prescribing?" there were 301 answers; affirma-

tive, 138; negative, 163. Some say: "Yes, but not discarding the old while our people continue to think in $\frac{1}{4}$, $\frac{1}{3}$, $\frac{1}{2}$, etc., instead of $\frac{1}{5}$, $\frac{1}{10}$, $\frac{1}{100}$, etc." "Yes, if made universal," "It's more scientific," "Hundreds of physicians do not understand it, and it would cause many serious mistakes," "No!!! Be Americans, and for God's sake quit aping other nations."—*Jour. Amer. Med. Assoc.*, September 10.

The above interesting article, which is only quoted in part, should be read in its entirety.

C. B. L.

PHARMACOLOGICAL NOTES.

PHYSIOLOGICAL ACTION OF APOCYNUM CANNABINUM.

According to T. S. Dabney, M.D. (*Therapeutic Gazette*, 1898, p. 737), the principal action of *Apocynum cannabinum* is upon the heart. This observation is based on a series of experiments conducted by Dr. J. Rose Bradford to ascertain the physiological action of this drug. "The heart of the dog is slowed down to two beats to one respiration, and even as low as three beats to two respirations. It will thus be seen that it is more powerful than digitalis. No such results have been obtained experimentally from the use of digitalis, for the vagus becomes paralyzed before this point is reached.

"Apocynum strengthens the heart and increases its tone, so that it stops the heart of the frog in systole. In mammals the heart is stopped in diastole, though a massive dose may stop it in systole. Clinically, it has been found to regulate in a marked manner the action of the irregular heart, but it *does not* slow the normal heart. It will be seen that it very closely resembles the action of *strophanthus*—itself one of the *Apocynaceæ*—*digitalis*, *adonidin*, *caffeine* and *sparteine*, but it is the most powerful of the group. Its action on the arteries differs from that of *digitalis*, as is shown by changes in the blood-pressure. It causes no contraction of the arteries, hence no increase in blood-pressure. It, therefore resembles *strophanthus* rather than *digitalis* in this respect." These statements are said to be substantially confirmed by experiments carried on by Dr. Ringer in University College Hospital, Cambridge, England; while the investigations of Dr. Solokoff, in the clinical laboratory of Prof. S. P. Botkin, St. Petersburg, are also said to have shown "slowing of heart's action, enlargement of pulse-wave and *marked rise of blood-pressure*."

"According to experiments conducted by Petteruti and Somma (*Il Policlinico*, Nos. 10 to 14, May to July, 1894) far different results were obtained when the decoction was used instead of the tincture. The decoction seemed to act mainly on the stomach and intestines, promoting catharsis and emesis, when emeto-cathartic action was delayed, decided action on heart was noted and a resultant increased diuresis and acceleration of heart-beat. The tincture was found to be free from gastro-intestinal irritant effects, even when given in large doses."

These authors claim: "A marked effect of the tincture is the production of diuresis, which is never accompanied with albuminuria; when albumin is present, it has disappeared after a course of the tincture." This latter statement is said to confirm the same point made in Dr. Dabney's paper published in 1880. "Apocynein being soluble in boiling water and insoluble in dilute alcohol, probably accounts for the nauseating effect of the decoction. Apocynin, on the other hand, is insoluble in boiling water, but soluble in alcohol." "It will be seen, then, that the two alkaloids isolated in 1883, by Schmiedeberg, have different properties." The paper concludes with the statement "that apocynum acts as a diuretic through its cardio-kinetic action, and not by irritation of renal epithelium"—a view claimed in Dr. Dabney's original paper on this subject.

J. L. D. M.

CASTOR-OIL BEANS.

A case which was puzzling, for the reason that the cause of death was not discovered until the coroner's inquest, occurred recently in a child aged 4 years. The child was taken suddenly and violently ill, and died in a short time, the father stating his belief that some beans which the child had taken from an uprooted plant in a vacant lot had poisoned her. Upon investigation, it was found that the beans were taken from a castor-oil plant, and that they had caused an acute nephritis from their poisonous and irritating action. Several other children were made very ill, but no other casualties beyond the one mentioned have been recorded thus far.—Letter from Philadelphia to the *Medical News*, November 26th. C. B. L.

POISONING BY "HEADACHE POWDERS."

Dr. Robert W. Greenleaf (*Boston Med. and Surg. Jour.*, October 13th) records the case of a woman to whom he was called in

consultation by Dr. Coggeshall. He describes her condition as follows:

The symptom which specially attracted our attention was the extreme degree of cyanosis. This was one of a peculiar bluish tinge, most marked in the fingers and lips. Her pulse was weak, but otherwise she did not appear so ill as the degree of cyanosis would lead one to expect.

"The immediate treatment," he says, "consisted of rest and aromatic spirits of ammonia. Under these her strength gradually returned."

It appears that the patient had bought a packet of powders purporting to be a positive cure for sick and nervous headache. Analysis showed that each powder contained three grains of acetanilide and two grains of phenacetine, with a little caffeine. She had taken five of the powders during the night, and had thus ingested in all fifteen grains of acetanilide and ten grains of phenacetine.—*New York Med. Jour.*, November 5, 1898. C. B. L.

A CURIOUS CASE OF PHOSPHORUS NECROSIS

is recorded in the *Lancet*, due to the inhalation of phosphorus fumes. The patient was a man of good health, consuming about twenty cigars a day, and using many matches to each one, as he frequently interrupted the smoking during his work. It was computed that for the last twenty years he had daily inhaled the vapor given off by over 100 matches. The progress of the disease involved the loss of one of the maxillæ, and eventually death from exhaustion.—*Philad. Med. Jour.*, December 10, 1898. C. B. L.

SUPRARENAL EXTRACT.

Von Cyon states (*Deutsche Med. Woch.*, from Pflügers Archiv für Phys., p. 370) that suprarenal extract has a highly stimulating effect on the sympathetic nervous system of the heart and the vessels (accelerants and vasomotors), while it has a paralyzing effect upon the regulator nerves of these organs, the vagus and depressor.—*Journal American Medical Association*, p. 1246. J. L. D. M.

A CASE OF SULPHONAL POISONING.

Richmond (*British Medical Journal*, October 29, 1898) reports the case of a middle-aged woman to whom 2 drams of sulphonal were administered accidentally. The patient became unconscious,

EUPHTHALMINE.

Trentler (*Klin. Monatsbl. f. Augenheilk.*, September, 1897, *Archives of Ophthalmology*, xxvii, p. 106) states that euphtalmine is the hydrochloric acid salt of the mandelic acid derivative of n-methyl-vinyldiacetonol-kamine. It is a white crystalline powder, readily soluble in water. It bears the same relation to eucaine "B" that homatropine does to tropacocaine. It may be employed in 2, 5 and 10 per cent. solutions. The instillation of the solution causes but slight burning sensations. As a mydriatic, a 5 or 10 per cent. solution is about equal in effect to 1 per cent. homatropine, but it affects the accommodation less and both disappear much more quickly. It is more powerful, but slower than cocaine, and does not similarly affect the corneal epithelium. A 2 per cent. solution will give moderate mydriasis in half an hour without disturbing the accommodation which will disappear entirely in two or three hours. Thus far no unpleasant constitutional effects have been noticed.—*Boston Med. and Surg. Jour.*, November 17, 1898. J. L. D. M.

UROTROPIN, A NEW URINARY DISINFECTANT.

Wilcox (*Medical News*, November 12, 1898) writes on the use of *urotropin* as a urinary disinfectant. This substance is formed from the union of ammonia and formaldehyd, and appears in the form of colorless crystals. The drug causes alkaline urine to become acid, thereby clearing its turbidity, and has such an inhibitory effect upon the development of microorganisms that they do not grow in urine in which it has been excreted, even after artificial inoculation. Wilcox reports a number of cases, one of enlarged prostate and heart-failure, another of phosphaturia, a third of acute specific urithritis, and a fourth of cystitis with renal disease, in all of which excellent results were obtained. He concludes that, in doses of 30 grains per day, it renders alkaline urine acid, prevents the development of bacteria, and it is indicated as a disinfectant before operation on the urinary tract.—*Phil. Med. Jour.*, p. 1057. J. L. D. M.

Ehrlich's Drazo-Reaction in Urine.—Krokiewics (*Wiener Klin. Woch.*) has examined 1105 different cases, of which he made 16,167 tests for Ehrlich's diazo-reaction and recommends the test on account of the prognostic value in typhoid and tuberculosis.—*The Med. Age*, 1898, 572.

EDITORIAL.

GERMS AND DISINFECTION.

It is difficult to conceive in these days that some of the various classes of the animal and vegetable creation as some of the microbes, fleas and bed bugs, etc., were not intended to share the habitation of man, or at least with man, and some of the lower animals. The researches of Nuttall and Thierfelder, of the Hygienic Institute, of Berlin University, indicate however, that bacteria are not necessary to vital processes. They removed young guinea pigs from the mother by means of the Cæsarean operation, and every conceivable precaution was taken to prevent all access of bacterial life. "The young guinea pig was placed in a sterilized chamber supplied with sterilized air, and it was fed exclusively upon sterilized milk." At the end of eight days the animal was killed and cultures made in various media of the intestinal contents and excreta. No colony made its appearance and the authors "claim by these experiments to have proved conclusively that the *presence of bacteria in the alimentary canal is not essential to vital processes, at any rate in the case of guinea pigs;*" and they consider that other animals, as also human beings, could exist in the absence of bacterial life so long as the food supplied is purely animal in character. They further experimented in adding vegetable food to the diet and found that here also bacterial life is apparently not essential for carrying on digestive processes.

Our observations in nature would likewise indicate that fleas and bed bugs lived originally like "sand flies" and "jiggers" among the wild plants. They have found, however, that, like the ubiquitous tramp in some sections, that man or his dwelling places may be utilized as a "stopping place" to rest and be refreshed until told to move on. Civilization, it would then seem, is responsible for providing places of abode for these different objects of nature which would have been content possibly—like the negro—to remain in their original home. We find about us everywhere germs and insects and other organisms feeding upon our garden crops, house plants, furniture, food and even ourselves. They invite themselves and feel that they are, or ought to be, welcome and make us uncomfortable or drive us away from our abode just as our forefathers drove the American Indian from his lands (his by reason of the law of priority) in order to live and prosper.

All nature is one great family. All, like the tramp, will sleep in the king's bedchamber, and partake of his wines if opportunity presents, but woe unto him if he is caught napping. Those in possession may keep the invaders out. The weak inevitably succumb to the strong. There is a survival of the fittest, *i. e.*, the most intelligent, cunning and powerful. Those that are of the greatest benefit to the greatest number of those that survive are permitted themselves to survive. The hornets' nests are burned; the bee hives are preserved. The wolves and wildcats are destroyed and the cats and dogs are domesticated and serve us. We say the former are injurious to us, and that the latter are serviceable to us. And so it is with the germs. Some that seek possession are injurious, others may be of service and may be likened to our "pet animals," and called "pet germs." They, like the cats and dogs who keep out the destructive rats and mice from our dwellings, may serve an equally important function, though originally they frequented other fields, and by long

domestication may claim a share of our abode. We have thus intentional domestication of things we have seen, and unintentional domestication of things which we did not see until comparatively recently.

In the January issue of this JOURNAL attention was called to a novel hygienic method in the handling of bread, and also to the statement that an investigator had discovered what seemed to him to be the pathogenic agent of influenza. The trend of modern life is to discover germs and to devise ways to keep them out. We have, as a result, the movement of the individual drinking cup in the churches and elsewhere. In the household processes of sterilization are being employed in preparing food, and our babies are treated almost like the young pigs of Nuttall and Thierfelder, and still they die. The reason for this is, as was shown in a recent issue of this JOURNAL, that the heat of summer is an important factor in the disturbances of children at that time. In our mad search for discovering germs and harnessing them, we are forgetting that there are other factors that play an important part, viz.: climate, constitution, etc., and that inasmuch as we cannot get two organisms just alike we do not know what influence these various other factors play. We discourse and think seriously on the subject of microbes and sterilization, and like Pasteur find that we are unconsciously (by reason of our very absorption in the topic) drinking the very liquid in which we have washed the cherries we are eating.

It must be admitted that the modern precautions against germs are doubtless of some benefit, but we fear that the very avenues which need protection to the greatest extent, as the sterilization of money, and of books, and of barber shops, and of so many of the most important and common media for the circulation and distribution of disease are totally neglected, for practical reasons. We see no reason why the Board of Health should not indicate how bank-bills and coins should be sterilized by every one just as much as the water which he drinks—save that it is not practicable, apparently. We might sterilize all day and die from exhaustion in a very short time, judging from the experience of Nuttall and Thierfelder, who in the course of but eight days' investigations with young guinea pigs were so exhausted that they killed the animals and concluded their experiments. Professor von Pettenkoper has well said: "Human intercourse can never be made germ-tight."

It is those who understand least of the nature of germs and disinfectants that are most deluded by the subject. It is said that not long ago "a gang of coalies at Hull refused to discharge a cargo of coals until they had been disinfected." While Dr. Koch, when he "made his first visit to the Hamburg hospitals found everything prepared in the most correct style, *usque ad unguem*, and on his finishing with the first ward was invited in the usual manner to wash his hands with the most scientific soaps, disinfectants, etc. He declined, observing nonchalantly, 'There will be plenty of time for that presently.'"

Scientists know very little about these germs and their life history. Some knowledge has been gained and some advances are being made in the manner of carrying on disinfecting and treating disease supposed to be due either to the germs or the products that they produce. How little we know is well shown in the immense amount of work that has been done on the cholera and typhoid germ? So that it has come to pass that we have practically two classes of persons who view the subject of germs and disinfectants differently. One recognizes in the germ a cell, an organism, which, when destructive to a being,

is at war with the latter, and regards the matter from a material standpoint, and says if the germ cells overcome the cells of the organism the latter will succumb. I will, therefore, strengthen my cells. I will drink and eat and live so that my cells shall be healthful, and in the fight going on (consciously or unconsciously) will be the victor. The other says: "All the actions of daily life, our down-sitting and uprising, our clothes, our dwellings, the newspapers, the train, the cab, the theatre, our every bite and sup, our work and our play, all are fraught with the most hideous perils, our doom has been spoken, and only one thing can save us, and that is to jump into a bath of carbolic acid and stop there. For deadly germs lie in ambush on every hand, and we all know that they yield to no power but that of disinfectants." The truth lies between the two extremes; a healthful organism is less likely to suffer from the attacks of germs, but a sick or debilitated organism is much assisted in the warfare by not only a strengthening diet, but by the proper use of disinfectants. It must also be borne in mind that many factors influence disease, and that the strength and tone of the organism at the time of attack and the use of disinfectants are but two of these.

REVIEWS AND BIBLIOGRAPHICAL NOTICES.

A TEXT-BOOK OF VOLUMETRIC ANALYSIS. By Henry W. Schimpf, Ph.G., M.D. New York: John Wiley & Sons. 1898. Pp. 522.

The present volume is the third edition of this book; the first edition appeared in 1894. The work is designed for the use of pharmacists, and, especially, as a text-book for students in pharmacy; for this reason, it has special reference to the volumetric processes of the pharmacopœia of the United States.

Some parts of the book have been revised, but the author has not remedied the many minor defects which we consider to be the shortcomings of the book. This edition, like its predecessors, contains a useless list of so-called approximate atomic weights, the members of which compare very irregularly with those of the list of Meyer and Seubert, given on the same page (xxviii). As in the two preceding editions, the author still extends the decimal fractions derived from his approximate molecular weights, only to the third or fourth place, when stating the factors for 1 c.c. of normal volumetric solutions; while in the case of the factors for decinormal volumetric solutions, he employs the numbers derived from the exact atomic weights of Meyer and Seubert, as adopted by the U.S.P., and extends the fractions sufficiently to include all of the figures in the numbers representing the atomic weights. The present edition, like the first and second, bears a blemish which was borrowed from the U.S.P.; this is the sanction of the author to use the "rounded off" weights of materials which the pharmacopœia of this country directs to be used in preparing volumetric solutions "when a delicate balance and exact weights are not at hand." Since these quantities are invariably greater than those needed, the absurdity of bettering the matter by "rounding off" the numbers on an inaccurate balance is very evident. There is at least one good reason, and it contains a commercial idea, why a book of this kind should be free from such inconsistencies as those referred to; it is this—a teacher does not relish the necessity of repeatedly explaining these incongruities to each individual student as the latter encoun-

ters them from time to time in his laboratory work, and, for that reason, he will endeavor to have his students avoid the use of a book containing them.

Barring what we believe to be the shortcomings of the book, we consider it admirably adapted as a text-book for the student of volumetric analysis, for it treats of this branch in such a manner that the intelligent reader can easily comprehend and follow the subject.

Much new matter that will increase the usefulness of the book to the pharmacist has been added. The author has retained in the book some matters which are not dealt with by volumetric methods. Several new cuts have been introduced; the workmanship on some of them does not reflect credit upon the present state of the art. We note a typographical error on page 239, where the word sulphuric is incorrectly spelled.

JOSIAH C. PEACOCK.

FORMULAIRE HYPODERMIQUE ET OPOTHÉRAPIQUE. Injections sous-cutanées d'Huiles médicamenteuses d'Essences, de substance minérales, d'Alcaloïdes de Sues amimaux, de glandes, d'organes et de muscles, par E. Boisson et J. Mousmer. 1 vol. in 18 de 261 pages, avec 21, figures intercalées dans le texte. Paris: J. B. Baillière et Fils. 1899. 3 fr.

This little volume consists of four parts: (1) Technique Hypodermique; (2) Formulaire Hypodermique; (3) Memorial Hypodermique; (4) Formulaire Opothérapique. The technique in preparing solutions for hypodermic use and the different instruments on the market for their use are well described and illustrated. The formulæ given represent a collaboration from well known sources besides that from the authors' own experience. On animal extracts the authors present the historical side as well as the *modus operandi* in preparation. The work is very timely and will be of great value to both physician and pharmacist. Its low price and its extreme usefulness will doubtless give it a large sale.

A POCKET MEDICAL DICTIONARY. By George M. Gould. A new edition. Philadelphia: P. Blakiston's Son & Co.

This new edition of Gould's Pocket Medical Dictionary gives the pronunciation and definition of the principal words used in medicine and the collateral sciences. The supplement contains a table on "Clinical Eponymic Terms," and is a novelty which the physician will appreciate. The definitions are concise, and the style and size of the book are such that it will prove invaluable to medical students and physicians for hurried reference.

MODERN SYNTHETICAL MEDICINAL PRODUCTS. By V. Coblentz. Reprint from *Jour. Soc. of Chem. Ind.*, August 31, 1898.

One of the most interesting fields of investigation, and one which has been opened but a comparatively few years, is the preparation and application of modern synthetics.

When O. Fischer, in 1822, discovered Kairin, it was demonstrated not only that nature's products might be imitated, but that by the removal or addition of certain groups or radicals, products would be formed which would be free from objectionable qualities. Thus cocaine, while possessing in itself irritating and toxic properties, is now replaced by Eucaïne "B," in which the undesirable features have been practically eliminated.

The method of classification adopted "consists in arranging the bodies into general groups according to medicinal action; as, for example, antipyrites,

antiseptics, hypnotics, etc. Under these groups the compounds are arranged into these various chemical classes. The object of this has been to give prominence to the presence of certain groupings which occur in each of these classes, and to the influence exerted by the introduction of new groupings; in other words, to show, wherever possible, the relationship between chemical constitution and physiological action." The author has come to be regarded an authority on the subject of modern synthetics, and the paper is one full of information and value.

THE PHYSICIAN'S VISITING LIST FOR 1899. Philadelphia: P. Blakiston's Son & Co.

This is the forty-eighth year of the publication of The Physician's Visiting List. It is primarily intended as an account book for keeping notes on engagements, addresses, etc. There is also contained a brief article on the Metric System, by Professor Oldberg; dose table; comparison of thermometers, and other useful information. The work is well arranged; the paper and finish of the best, and, because of its usefulness to the physician, well deserves to be nearing its fiftieth anniversary of publication.

PROCEEDINGS OF THE AMERICAN PHARMACEUTICAL ASSOCIATION at the forty-sixth annual meeting, held at Baltimore, Md., August, 1898. Also the Constitution, By-Laws and Roll of Members. Baltimore: 1898.

Volume 46 of the Proceedings of the American Pharmaceutical Association comes to us at the beginning of the new year with considerable gratification. The Secretary and Reporter on Progress of Pharmacy are to be congratulated that they have expedited the publication of this work so that in four months after the meeting the results are in the hands of its members. This alone enhances the usefulness of the work considerably, as there are so many things contained in the proceedings that the investigator desires readily to see, and it is this volume that he places considerable reliance on and obtains time-saving assistance. The proceedings of the Association have already been referred to in this JOURNAL. We note a mistake on p. 240, in that some remarks made by Mr. Edwin M. Boring, of Philadelphia, are accredited to Prof. F. X. Moerk. It is safe to say that every pharmacist, with the interest of his profession and business at heart, requires a copy of this storehouse of information, and ought, by membership in the organization, contribute his support and sympathy. It is very evident that the leaders and pioneers in American pharmacy are devoting their best energies during all the year for these annual meetings, and from which emanates the light which shows the progress of events and whither we are drifting. The year 1898 is shown by the proceedings to be as encouraging to the American pharmacist as Dun & Co.'s or Bradstreet's report indicate the year has been throughout the business world in America.

AMERICAN PHARMACEUTICAL ASSOCIATION.

To the Druggists of the United States and Canada.

In the daily life of the druggist many questions arise of a practical nature which might be answered by a series of experiments, but which for lack of time, of suitable apparatus, or of other facilities, remain unsolved. Such are trouble-

some or unsatisfactory formulas, difficult or unsightly prescriptions, questions of the relation of quality to cost of drugs or chemicals, lengthy or complicated processes which might be simplified, and problems concerning all phases of practical pharmacy.

The colleges of pharmacy of the United States and Canada are in a position to work out many of these problems without cost to the druggist, and would doubtless be glad to show their interest in practical matters by undertaking such investigations and presenting their results in papers at the next meeting of the American Pharmaceutical Association.

The Association is in sympathy with the druggists in these matters, and will undertake to find investigators for such questions as may be submitted. To this end all druggists, whether members of the Association or not, are invited to send questions or descriptions of difficulties concerning any branch of practical pharmacy, improvements desired in specified formulas (wherein a difficulty is described), etc., as early as possible.

Inasmuch as the colleges close in the early spring, and time is required for investigation, an early attention to this invitation is desired. No questions should be submitted later than May 1, 1899. While the committee cannot agree to solve all problems and must reserve the right to reject such as are not of general interest, yet with your prompt co-operation in stating what you, as a practical druggist, are specially interested in, we hope to make this of personal as well as of general value.

Address all communications to

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On behalf of the Scientific Committee A. Ph. A.

NATIONAL PURE FOOD AND DRUG CONGRESS.

The second annual meeting of the National Pure Food and Drug Congress was held in Washington from January 18 to January 21, 1899. The first Congress met in March of last year and adopted a bill which provided for the organization in the chemical division of the Department of Agriculture of a food, beverage and drug section, under the direction of the chief chemist, to undertake the analysis of foods, beverages, condiments or drugs offered for sale in the States, District of Columbia and Territories of the United States, provided the same be in original or unbroken packages. Also for the prohibition, under certain penalties, of the sale within such limits of adulterated or misbranded articles, for their seizure, condemnation and sale where discovered in transit, and for the purchase and examination of commercial samples of such articles at the discretion of the Secretary of Agriculture; also, for the enforcement of the law by District Attorneys. It defined what shall be regarded as an adulteration or misbranding within the meaning of the act; how compounded food preparations shall be branded, and how samples shall be acquired for analysis, and, finally, provided that the Secretary of Agriculture shall call upon the association of official agricultural chemists and such physicians, not less than five, as the President of the United States shall select from the medical department of the army and navy and the United States Marine Hospital, and five chemists to be selected by the American Chemical

Society, to determine jointly the standard of all food products (within the meaning of the act), such standards to guide the chemists of the Department of Agriculture in the performance of the duties imposed on them by the act, and to remain the standards before all courts. The officials appointed to determine the standards must confer with and consult the duly accredited representatives of all industries for which standards are to be established. In this shape it was given to both the House and the Senate, and but for the war following close upon its presentation would undoubtedly have been pressed to a speedy issue.

When that Congress adjourned it was as a permanent organization, first to secure the legislation desired, next to prevent undesirable amendments.

At the meeting on January 18th there were present delegates appointed by the Governors of thirty-four States and Territories, representatives of six departments of the National Government and delegates from both National and State organizations.

Commissioner J. A. Wight, of the District, opened the meeting with an address of welcome. Frank Hume, representing the local Food and Drug Association, followed with the history of the movement which had culminated in the Congress.

The President, J. E. Blackburn, Ohio, in his address, said the question of what shall we eat began with Eve in the Garden, and "what a myriad of evils would have been avoided had not the first of all pure food laws been violated."

Secretary of Agriculture Wilson and his assistant, Mr. Brigham, spoke in unqualified approval of the bill and the urgent need for the passage of it.

Dr. William Frear, in his report of the Executive Committee, showed the work done during the interim and the status of legislation.

The pharmacists were called together by Mr. M. N. Kline, and organized with Henry M. Whitney, Massachusetts, Chairman, and E. A. Cornell, Williamsport, Pa., Secretary; Mr. Kline, with Dr. F. A. Stewart and Dr. Eccles, of New York, were named as a Committee on Legislation for Trade-marks.

On January 19th, Hon. Marriott Brosius, of Pennsylvania, patron of Bill in the House of Representatives, made an important address, in which he spoke of the relation of people to legislation, and he put it upon the people, and not the lack of backbone of the Congressmen that the Pure Food Bill was still in the hands of the committees.

The legislators are here, he said, to do the will of the people they represent, and if the people are inert, are sunk in the slough of apathy, and have not commanded their servants, the responsibility rests with themselves.

The report of the Treasurer, Mr. R. N. Harper, of Washington, D. C., showed \$1,109 expended and \$135 balance on hand.

The report of the Corresponding Secretary, A. J. Wedderburn, of Dunn Loring, Va., recited the efforts made for the bill and the Congress.

In the afternoon Dr. H. W. Wiley made an able address on "The Ethics of Pure Food."

The report of the Committee upon a method for securing uniformity in State pure food legislation, in trademarks and in chemists' analyses was rendered in part by Prof. J. H. Beal, Ohio, who urged the necessity of a national law as a guide in making State laws, and by Dr. Frear, who gave an outline of the

work done by the Society of Official Agricultural Chemists, and recommended the adoption of their standards.

E. T. Abbott, of Missouri, Chairman of the Committee on Credentials, submitted his report, after which the following committees were announced by President Blackburn :

Committee on Rules and Order of Business.—Edward Graves, T. R. Smith, S. A. Clark, C. Schnepf, D. W. Coons, M. E. Church, Dr. William Watters, R. E. Boschert, H. P. Gilpin, Thomas F. McCormick, F. S. Langton, G. B. Brockett, A. W. Blair, James M. King, John O. Nicholson, F. J. S. Robinson, J. S. Haines, H. M. Britteny, U. O. B. Wingate, C. A. Catlin, George A. Newman, Frank Benton, M. N. Kline, W. G. Thomas, W. J. Reed.

Committee on Resolutions.—Dr. H. W. Wiley, C. C. Higgins, H. A. Clark, T. N. Banks, D. W. Coons, M. E. Church, Dr. William Watters, Thomas J. Keenan, A. J. Corning, P. H. Hansen, George A. Sherer, J. T. Kennedy, Dr. Parker, James M. King, John C. Nicholson, F. J. S. Robinson, J. T. Cox, W. M. Lowney, S. H. Meadows, Charles A. Catlin, George A. Newman, Frank Benton, W. J. Reed, W. G. Thomas.

Committee on Organization.—Frank Hume, F. W. Herbst, H. B. Gilfry, W. B. McMechen, E. A. Abbott, H. L. Salisbury, Dr. William Watters, R. G. Eccles, Charles E. Dohme, P. H. Hansen, George C. Rew, Col. G. B. Brockett, Dr. A. Q. Holladay, James M. King, John C. Nicholson, F. J. S. Robinson, F. N. Barrett, G. M. Whitaker, A. H. Meadows, N. D. Arnold, George A. Newman, Frank Benton, W. J. Reed, M. N. Kline, W. G. Thomas.

At the evening session Hon. D. N. Perky, of Massachusetts, made a remarkably able argument on the subject, "Naturally Organized Food Makes Possible Natural Conditions."

At the morning session, on January 20th Prof. H. W. Wiley, of the Agricultural Department, presented the report of the Committee on Resolutions, which was interrupted to allow for Senator Mason's address, and resumed when the latter had finished.

The Committee on Organization then reported. It recommended the formation of a permanent society, having a written constitution and by-laws, with a list of officers corresponding to those heretofore existing. Amendments were offered to include a number of hitherto unrepresented bodies, and a proposition was made that the National Government should be represented by a Vice-President. Prof. H. W. Wiley was chosen for this office, the report as a whole being adopted.

Professor Hamilton, of Pennsylvania, read the report of the Sub-committee on a Uniform System of Marking for Drugs and Food Products Affected by Legislation, and the report was adopted. The hope was expressed that with a uniform system of marking, goods thus branded could be sent to any part of the country or abroad without further inspection.

The following officers were chosen for the ensuing year.

Joseph E. Blackburn, President, Columbus, O.; Frank Hume, First Vice-President, Washington, D. C.; Alexander J. Wedderburn, Corresponding Secretary, Washington, D. C.; Franklin Dye, Recording Secretary, Trenton, N. J.; R. N. Harper, Treasurer, Washington, D. C.

Executive Committee.—Dr. William Frear, State College, Pennsylvania; W. S. Thompson, Washington, D. C.; L. M. Frailey, Camden, N. J.; F. J. H.

Kracke, New York; W. A. Withers, Raleigh, N. C. President, First Vice-President and Secretaries are *ex-officio* members.

Chairmen of Committees.—Dr. William Frear, Executive, State College, Pennsylvania; D. N. Perky, Finance, Massachusetts; Dr. H. W. Wiley, Legislative, Washington, D. C.; J. H. Beal, State Legislation, Scio, O.; Frank Hume, Advisory, Washington, D. C.

Advisory Committee.—Frank Hume, Chairman, Washington, D. C.; Matthew Trimble, First Vice Chairman, Washington, D. C.; Dr. William C. Woodward, Second Vice Chairman, Washington, D. C.; Robert N. Harper, Treasurer, Washington, D. C.; J. D. Hird, Washington, D. C.; Beriah Wilkins, Washington, D. C.; J. F. Oyster, Washington, D. C.; Alexander J. Wedderburn, Washington, D. C.

In summing up the important features of this second Congress, it may be said that as large a number of delegates from the various States and Territories and various organizations were present as a year ago. Thirteen different resolutions were offered, most of them seeking to introduce modifications to the Bill, which were referred to the Committee on Resolutions, who reported in favor of TWO modifications of the Bill ONLY.

The first that the word "producer" shall be added in the Bill wherever the words "manufacturers and dealers" occur now; also, some transposition of that part of the Bill referring to adulteration of candies. All other proposed amendments or changes in the Bill offered were rejected by the Congress. It is the impression that the Bill cannot be considered at the present session of Congress, although it is believed that there is a fair chance of its being enacted into a law at the next session. Dr. Frear, the Chairman of the Executive Committee, who is, and has been, at the head of the practical work of the organization, was re-elected, and is really deserving of a great deal of credit for the excellent work which he has done. Professor Beal, of Ohio, who was a year ago made the Chairman of the Committee on Uniform State Food Legislation, made a most excellent report, and reports were also read on the same subject by Professor Hamilton, of our own Agricultural Department, and Dr. Frear.

MINUTES OF THE PHARMACEUTICAL MEETING.

PHILADELPHIA, January 17, 1899.

The regular monthly Pharmaceutical Meeting was held in the Museum of the College, with Charles Bullock in the chair.

The minutes of the previous meeting were allowed to stand as published.

There was an unusually good attendance, and the papers and discussions were both interesting and instructive.

F. W. Haussmann was the first speaker, and having been engaged in pharmacopœial research work, reported the results which he had obtained in experiments on "Syrup of Hydriodic Acid." The paper will be published in full in a later issue of this JOURNAL.

After a preliminary discussion of the merits of this syrup in connection with the objections which have been urged against it from time to time in various journals, Mr. Haussmann said, "syrup of hydriodic acid, prepared according to official directions, is equal to any similar preparation in the market, may be confidently recommended as such, and the material decrease in cost by self-

manufacture should induce every pharmacist to prepare his own syrup." In regard to the preparation of the syrup he said that he had no substitute to offer in preference to the official method, several improvements were, however, suggested and were embodied in an improved formula and directions relating thereto. He also proposed Volhard's method of titration for estimating the hydriodic acid present.

In discussing this paper, Prof. J. C. Peacock inquired whether the author had used any means of proving the absence of potassium iodide so as to enable him to say that all the silver nitrate had reacted with the hydriodic acid.

Mr. Haussmann replied that the amount of potassium iodide used was insufficient to produce a 1 per cent. preparation.

Mr. Kebler referred to a statement contained in the paper in regard to the action of glycerin on the hydriodic acid, when added to the syrup, with subsequent formation of allyl iodide, and said that there was evidence that analogous results occur with other alcohols.

Mr. Haussmann said that he was in doubt about the odorous principle being allyl iodide, but that on distilling syrup containing glycerin with potassium sulpho-cyanate he was convinced that the odor of the distillate was due to artificial oil of mustard (allyl-iso-sulpho-cyanate), although the quantities formed were extremely small.

In reply to a question by Professor Peacock as to whether the coloration of the syrup might be due to lead iodide, Mr. Haussmann said he did not think that such was the case, as other syrups show a coloration, an example of this being Eaton's syrup, which contains neither lead nor iodide.

Professor Peacock then asked if the author thought the color due to the caramelization of the sugar caused by action of the acid upon it. Mr. Haussmann held that opinion.

A paper on "Lithium Citrate" was presented by Lyman F. Kebler, and will be published in a subsequent issue of this JOURNAL. The paper embodied a consideration of the properties of this chemical, together with tests for impurities and a new method for estimating the percentage of pure salt. Samples obtained in various parts of the United States were examined, and not one found to be perfectly anhydrous. On account of the variability of the salt in this respect, even when marked U.S.P., the author favored the use of the hydrous salt, which is a uniform product.

The paper aroused considerable discussion, and those participating in it were Professors Peacock, Moerk and Remington, and Mr. Haussmann.

With regard to the presence of lead, Mr. Kebler said that he had found it in potassium citrate, but not in the samples of lithium citrate which he had examined; he accounted for this by the fact that a test for the presence of lead in the lithium salt is recognized by the Pharmacopœia, whereas no such provision is made in case of the potassium salt.

An abstract of a paper on a "Proximate Analysis of the Leaves of *Liatris Odoratissima*" was read by Charles Falkenhainer, Jr., a student of the College. The paper will appear in full in a later issue of this JOURNAL.

After considering some of the uses made of this plant, the author referred to the results of his analysis. Besides coumarin, the leaves were found to contain fatty, waxy and resinous substances, chlorophyll, sugars, mucilaginous and albuminous matters and inorganic constituents. An interesting

result was that about 50 per cent. of the air-dried material is soluble in water. The crystalline principle was subjected to ultimate analysis, and its identity with coumarin, as was pointed out by Professor Procter in 1859, proved thereby.

Dr. C. B. Lowe spoke of the distribution of this principle in the vegetable kingdom, and said that it was probably present in Tonka bean in greater amount than elsewhere. In regard to its physiological action he said that it was probably narcotic.

Others taking part in the discussion of this paper were Professor Peacock and Mr. Frederick Lewton, the latter referring to the immense trade in deer's tongue (as the plant is commonly called) in Florida, where it is sold to tobacco manufacturers for flavoring their products.

Prof. F. G. Ryan read a paper on "Analysis of Commercial Vinegar" (see page 71), which aroused considerable discussion, partly on account of its relation to the question of pure foods. Those remarking on the subject of the paper were Mr. Haussmann, the chairman, Professor Peacock and Mr. Kebler.

In reply to a query by Mr. Haussmann as to the presence of malic and tartaric acids interfering with the determination of the percentage of acetic acid in certain vinegars, Professor Ryan said that these acids were present in too small quantities to be taken into account. He said, however, that tests were made for the presence of sulphuric and some other acids.

Mr. Bullock made an interesting statement in regard to cider vinegar. He said that when cider had undergone fermentation a certain degree of acidity was attained, which on further oxidation was lost, but which as the process was continued again resumed its acidity.

"A Common Error in Recorded Results of Proximate Plant Analysis," was the subject of a communication by Lyman F. Kebler, and will be published in a later number of this JOURNAL.

The last item on the programme was an exhibition of a valuable collection of specimens recently received from the Philadelphia Museums, through the instrumentality of Mr. Howard B. French. The collection consists of nearly three hundred specimens, and attention was directed to the most interesting features by Mr. Frederick L. Lewton, Curator of the Museums.

The collection embraces the following :

Specimens of crude drugs from many parts of the world, particularly showing such as are used by the natives of Japan and China, and as are sold in the Indian bazaars ; seeds and fruits yielding oils used for medicinal, culinary, illuminating, lubricating and other purposes ; samples of gums and resins having a medicinal use and many of the most important varnish resins ; spices and aromatics used for flavoring foods and medicines, as well as for the making of perfumes ; roots, tubers, starches and other food materials and series of raw sugars, cacao, beans, etc.

A special vote of thanks was tendered Mr. Lewton for his interesting talk, after which Professor Remington referred to the magnitude of the work of the Museums, in various lines. Further reference was made to the influence of the Museums along commercial and scientific lines, and its connection with the Commercial Exposition next fall.

On motion the meeting adjourned.

THOS. S. WIEGAND,
Registrar.



THE AMERICAN JOURNAL OF PHARMACY

MARCH, 1899.

THE ASSAY OF BELLADONNA LEAVES AND SOME OF ITS PREPARATIONS.¹

BY FRANK X. MOERK.

✓ The results recorded in this paper were obtained in an investigation made for the J. Ellwood Lee Company, of Conshohocken, Pa., to determine the alkaloidal strength of belladonna plaster, U.S.P., 1890. After a survey of the work done by others in a similar direction, it was decided to purchase several pounds of the different commercial varieties of belladonna leaves, have these examined by a pharmacognocist for adulterations or admixture, then grind and use them for assay and manufacturing purposes. Accordingly, the three following commercial varieties were purchased: (1) English cultivated, Allen's; (2) German cultivated; and (3) German wild.

These were submitted to Professor Henry Kraemer for examination; his report, addressed to me, is as follows:

"I have carefully examined the three lots of belladonna leaves you sent me, and find them to be as follows:

"(1) The *English drug* is made up mostly of belladonna leaves with a few stems. Numerous mature and immature flowers are present, indicating that the drug was collected in early summer. The leaves are of a uniform green color, and the drug has a heavy narcotic odor.

"(2) The *German cultivated drug* consists chiefly of leaves with

¹ Read at the Pharmaceutical Meeting of the Philadelphia College of Pharmacy, February 21, 1899.

a few stems and some flowers and some rather immature fruits. The drug appears to have been collected some time during the middle of summer. Most of the leaves are of a green color upon both surfaces; the upper surface of the others is of a brownish color, the lower being greenish.

"(3) The *German Wild Drug* is made up of leaves, numerous stems, and shows some indications of the entire plant (when a year or two old) having been collected. There are numerous mature fruits, which indicate that this specimen was collected later in the season than the other two specimens. The leaves vary in color from an etiolated, yellowish green to brownish-black. The latter color indicates that little or no care was exercised in drying the drug."

The samples were then ground and used in the following work:

ASSAY OF THE LEAVES.

The method of C. C. Keller was looked upon favorably, and selected for the determination of the alkaloids. The writer regrets that he was not able to see the original publication in the *Schweiz. Wochenschrift für Pharm. u. Chemie*, and therefore had to content himself with the following abstract from the *Proc. Am. Pharm. Assoc.*, 1895, pp. 536 and 541:

Belladonna leaves, No. 80 powder			
(dried over CaO or H ₂ SO ₄)			
	25	grammes.	
Ether	100	"	
Chloroform	25	"	
Ammonia water, 10 per cent.	10	"	
Water	40	"	
Pour off	100	"	(= 20 grammes drug).

Place the drug in a bottle of 250 c.c. capacity, add the ether and chloroform, agitate for ten minutes, then add the ammonia water and agitate vigorously; continue maceration for one-half hour, add the water and agitate thoroughly to gather the drug in lumps so that the solution can be poured off clear. In case 100 grammes cannot be obtained at first, pour off as much as possible, and by gentle motion of the bottle, held in a horizontal position and allowing it to rest for a short time, the balance may be obtained. The solution is transferred to a separatory funnel and agitated with diluted hydrochloric acid (0.5 to 1 per cent.) in portions of 25, 15 and 10 c.c. respectively. These acid solutions are then placed in a clean separatory funnel, made alkaline with ammonia and treated

immediately with successive portions of 50, 30 and 20 grammes solvent (= 3 parts chloroform and 2 parts ether by weight). The combined ethereal extractions are set aside for a short time, and then passed through a small filter moistened with ether into a tared flask of 150 to 200 c.c. capacity, and the solvent distilled off. The residue is treated with 2 or 3 small portions of ether, the latter removed by heating the flask in a water-bath; the vapors of ether are finally removed from the flask by means of a current of air from a bellows, and the flask and contents heated in the water-bath for periods of fifteen minutes each, and weighed in the intervals until constant weight is obtained. The alkaloids are dissolved in 5 to 10 c.c. of neutral, absolute alcohol, water added to the beginning of a turbidity and the alkaloids titrated with $\frac{n}{10}$ or $\frac{n}{20}$ hydrochloric acid, using hæmatoxylin as indicator (3 drops of a 1 per cent. alcoholic solution).

As the result of some preliminary assays, several modifications of this process were made: (1) Moisture was determined in a separate portion of 2 grammes at 100° C., and the powdered leaves, without previous drying over lime or sulphuric acid, used in the assay. The reasons for this were that the maximum quantity of moisture present in 20 grammes leaves was about 2 grammes, and this was not considered to be sufficient to interfere with the penetration of the drug by the 125 grammes solvent used; the drying of a portion of the drug at the generally accepted temperature of 100° C. insured figures which could afterwards be utilized in calculating the alkaloid for a perfectly dry drug or for a drug containing a different per cent. of moisture. (2) The determination of alkaloids in the U.S.P. plaster made it likely that sulphuric acid would be preferable to hydrochloric acid, because of the presence of lead salts in the plaster, in removing the alkaloids from the ether-chloroform solution, hence, a diluted sulphuric acid (2 c.c. H_2SO_4 , diluted to 500 c.c.) was used. (3) It was found impossible to obtain 100 grammes of the ether-chloroform alkaloidal solution, so that 20 grammes drug were used instead of 25 grammes, with the quantity of solvent unchanged. (4) The extraction with diluted sulphuric acid and the ether-chloroform extraction of the acid solution were made in 4 portions of 25, 15, 10 and 5 c.c. each, the last portion being used to rinse the vessels which had contained the other

portions. A fifth portion of 20 c.c. ether-chloroform was used in a number of assays to determine if the alkaloids were perfectly extracted by the preceding four portions of solvent, but in no case did the residue obtained cause an alkaline reaction with the indicator.

The assay of the leaves therefore was conducted as follows:

Moisture determined in a separate portion of 2 grammes at 100° C.

Assay Proper.—Twenty grammes of the powdered leaves were placed in a glass-stoppered bottle of 250 c.c. capacity, tared, 100 grammes ether and 25 grammes chloroform added; after several minutes' agitation 10 c.c. ammonia water (10 per cent.) were added, and the mixture frequently agitated during one to two hours; after adding 4.0 c.c. H_2O agitate thoroughly for several minutes; set aside for ten minutes, and pour off as much as possible of the ether-chloroform solution into a clean, dry flask of about 150 c.c. capacity. Weigh this flask with contents, and after standing about one-half hour (to allow any drug and aqueous solution which may be carried over, to separate), pour into a separating funnel as much as possible of the clear ether-chloroform solution and weigh the flask with its residual contents. The difference between the two weights gives the weight of the solution transferred, and represents a certain weight of the leaves, the exact amount of the latter being calculated by the proportion:

125 gm., wt. of solvent used : 20 gm. :: wt. of transferred solution : x.

The ether-chloroform solution is extracted with four portions of acidulated water (2 c.c. H_2SO_4 to make 500 c.c.) of 25, 15, 10 and 5 c.c. respectively; the first three portions are collected in one beaker, while the last one is kept separately. After cleaning the separatory funnel the contents of the beaker are returned and the last portion of 5 c.c. acidulated water used to rinse this, and also returned to the separatory funnel; 5 c.c. water are then used to complete the rinsing of the beaker and added to the acid solutions. The acid solution is next agitated with 25 c.c. ether-chloroform (2 parts ether and 3 parts chloroform by weight), 8 c.c. ammonia water (10 per cent.) added and again thoroughly agitated; after separation the ether-chloroform is run into a smaller separator and extraction repeated with 15, 10 and 5 c.c. ether-chloroform; while this last portion is separating the first three portions are filtered through a small filter, wetted with the solvent mixture, into an Erlenmeyer flask of

120 c.c. capacity; the smaller separator and filter are then washed with the last ether-chloroform extraction and later by the use of 5 c.c. of the mixed solvent; finally, wash the stem of the separator and funnel and the filter with about 5 c.c. more of the solvent applied in portions. Distil off the solvent and warm on the water-bath until the odor of chloroform has disappeared; dissolve in 5 c.c. ether, evaporate this, redissolve in 5 c.c. ether and warm until the odor of ether has disappeared. Now dissolve in 8 c.c. neutral alcohol, dilute with 30 c.c. water, add 3 drops hæmatoxylin solution and titrate with standardized HCl to a pure yellow solution. The hydrochloric acid used in all of this work was standardized with fused sodium carbonate and 1 c.c. was found the equivalent of 0.02104 grammes mydriatic alkaloids.

EXTRACTUM BELLADONNÆ FOLIORUM ALCOHOLICUM.

While these assays were made the preparation of the extracts from 500 grammes of the leaves was progressing. The powder required for this not being as fine as needed for the assays, moisture determinations of each lot were also made. The Pharmacopœia directions as to the strength of the menstruum were followed, but it was found that the quantity prescribed did not, by appearances, thoroughly extract the drug, hence a quantity about double that ordered was used, and still the percolate was distinctly colored. Authority for this is found in the pharmacopœial directions to continue percolation until a specified quantity of percolate is obtained or the belladonna leaves are exhausted.

The evaporation of the percolate at a temperature not exceeding 50° C., to obtain an extract of *pillular* consistence was a very tedious operation, requiring several weeks' time. Using a weighed evaporating dish and glass rod the yield of extract was readily calculated; as soon as the extract was obtained of a *firm pillular* consistence it was weighed, thoroughly mixed and the several portions needed for moisture determination for assays and for the plaster weighed off without loss of time, and the preparation of the plaster proceeded with.

ASSAY OF THE EXTRACT.

Moisture by drying about 2 grammes at 100° C.

Alkaloidal Assay.—About 5 grammes of the extract were weighed into a beaker and disintegrated by stirring with small portions of a

mixture consisting of 10 c.c. water and 10 c.c. water of ammonia (10 per cent.); the extract mixture was put into a glass-stoppered bottle of 250 c.c. capacity, and the beaker rinsed with the remainder of the diluted ammonia water used in portions. Into this bottle were then weighed 60 grammes ether and 15 grammes chloroform, the mixture agitated continuously for ten minutes, and set aside for ten minutes, when the ether-chloroform solution was poured off as completely as possible into a clean, dry flask, weighed and set aside for one-half hour. As much as possible of the ether-chloroform solution was then poured into the separatory funnel, the flask and residual contents weighed (to ascertain the weight of the transferred solution) and the assay proceeded with, as described under the assay of the leaves. The quantity of extract used for the completion of the assay was calculated by the following proportion:

75 gm., wt. of : wt. of extract started with : : wt. of transferred : x.
solvent used : : portion.

In the assay of the extract from the English cultivated leaves it was found that the first portion of 25 c.c. of acidulated water did not cause an acid reaction, so that 40 c.c. were used in the first portion, followed afterwards by three portions of 5 c.c. each.

EMPLASTRUM BELLADONNÆ, U.S.P., 1890.

As stated before, as soon as the extract of belladonna was obtained of the proper consistency it was weighed, mixed and portions weighed off for the various determinations and for the making of the plaster. Forty grammes each of resin plaster and soap plaster (purchased from a manufacturing house) were melted in a weighed evaporating dish placed on a water-bath and 20 grammes of the extract, weighed on a watch crystal, incorporated by heating on the water bath whilst constantly stirring; unnecessary heating was avoided, but still a loss of about 1 per cent. was noticed in each case; by weighing the contents of the dish before adding the extract a loss of 0.3 to 0.4 grammes was noticed, so that the greater portion of the loss is due to the moisture in the extract used. *In the Pharmacopæia this loss in making Belladonna Plaster has not been recognized.*

Assay of the Plaster.—After several unsuccessful trials of what seemed possible methods, the following was decided upon and found to give conforming results. It depends upon the decomposition of the soap and of the lead salts by sulphuric acid, and from calcula-

tions made 1 c.c. sulphuric acid, U.S.P., is a little more than needed to decompose 10 grammes of the official plaster.

Ten grammes of the belladonna plaster were weighed into a beaker and covered with a mixture of 1 c.c. sulphuric acid and 15 c.c. of water; the plaster is disintegrated by stirring and pressing against the side of the beaker, but is slow, as no heating is allowable saving the heat of the hand; if heating over a burner is resorted to the lead sulphate and fat acids separate in pulverulent form, and are then more difficult to manipulate. The end of the operation is assured when the stirring rod no longer discloses any hard lumps in the putty-like mass produced, if manipulated as described. The acid solution is filtered through a small filter into a separatory funnel and the mass worked with the glass rod so that as much of the solution as possible is separated and removed to the filter. The mass in the beaker is then thoroughly mixed up with two portions of 10 c.c. each of the acidulated water (2 c.c. H_2SO_4 to make 500 c.c.), followed afterwards by three portions of 5 c.c. each, allowing to settle and working up the mass so as to get as much as possible of each portion upon the filter before adding the next portion. After all these portions have run through the filter, wash the latter with a few c.c. of the acidulated water, then add to the contents of the separatory funnel 25 c.c. of the ether-chloroform mixture, 10 c.c. of ammonia water (10 per cent.) and proceed as under the assay of the leaves.

EMULSIFICATION IN ALKALOIDAL EXTRACTIONS.

While emulsification in assays of belladonna leaves and extracts by the described processes were occasionally met with, the assay of belladonna plaster as just described was effectually blocked by the formation of a persistent emulsion. In the case of the leaves and extracts the relatively large proportion of the clear mixed-solvent with the smaller emulsified portion was run into the smaller separator and then generally separated on standing a short time; the aqueous solution thus transferred to the smaller separator was freed from alkaloid by agitation with the portions of solvent used to rinse the separator; in the subsequent filtration care was taken to prevent the aqueous solution passing on to the filter. This manipulation did not avail in the assay of the plaster, and it therefore became necessary to find some expedient which would bring about the separation of the solvent.

It is this particular drawback—the emulsification of the alkaline solution when agitated with the alkaloidal solvent—that has done more than any other single factor to prevent alkaloidal assaying from being more generally applied; it has also given rise in certain assay processes to the direction “to mix the alkaline solution and alkaloidal solvent by a rotary motion, or by gentle agitation,” as distinguished from shaking “to prevent emulsification.” Such directions may be suitable for extracting alkaloids which are practically insoluble in the alkaline solution, and where one can see the alkaloid dissolving in the solvent, but I cannot believe that total extraction results in case the alkaloid remains soluble in the alkaline solution, as is the case with the belladonna alkaloids. This same view has been expressed by Dr. E. R. Squibb, in a recent article on the assay of ipecac, *AM. JOUR. PHARM.*, 1899, p. 11.

After numerous failures it was found that the addition of a small quantity of stearic acid was effectual in separating the emulsified alkaloidal solvent, and that it could be used after emulsification had taken place, or by adding it before agitating the alkaline solution with the solvent, it would prevent serious emulsification. (Other fat acids while not tried, will very likely produce the same result.) A small quantity, weighing 10 to 15 milligrammes, or even less in many cases, is sufficient, and is best added in several small fragments; if these be shaken vigorously with an emulsified mixture, and then allowed to stand for a few minutes, separation will begin, or can be made to begin by a *twirling* motion imparted to the stem of the separator; it may not be possible to obtain the entire quantity of the solvent at once, but by running off the clear portion to the smaller separator, a portion again of the remaining emulsion will respond to this same coaxing twirling motion, and can be transferred to the previously removed portion, and the operation repeated until only about 1 c.c. emulsion remains. In this way it was found possible to complete, in about two hours, the several extractions in the assay of a plaster, the first extraction of which had remained emulsified for two days. It may happen that a little more stearic acid is needed after the first extraction.

This same separation may be effected by fusing a little stearic acid on the end of a piece of iron wire and stirring the emulsified portion with this, running off the clear solution and repeating the operation; this method, however, involves the taking up of more stearic acid by the solvent.

The question suggested itself: "To what extent does the stearic acid interfere with the accuracy of the assay?" The following experiments answer this question:

(1) 0.100 gramme stearic acid (a quantity far in excess of that actually used in the assays) was dissolved in 10 c.c. alcohol, 1 c.c. of a diluted ammonia water, 30 c.c. water, and 3 drops hæmatoxylin indicator added, required 0.75 c.c. HCl.

(2) In a similar experiment, omitting the stearic acid 0.75 c.c. HCl were needed.

(3) 0.100 gramme stearic acid dissolved in 10 c.c. alcohol, 0.5 c.c. of a more dilute ammonia water, 30 c.c. water, and 3 drops indicator added, required 0.2 c.c. HCl.

(4) A similar experiment, omitting the stearic acid required 0.3 c.c. HCl.

(5) 0.100 gramme stearic acid in very small fragments agitated with 25 c.c. water, and 3 c.c. ammonia water (10 per cent.) were extracted with the several portions of alkaloidal solvent as in an assay; the residue obtained dissolved in 8 c.c. alcohol and diluted with 30 c.c. water required after addition of 3 drops indicator and 0.5 c.c. diluted ammonia water (same as used in (3) and (4)) 0.25 c.c. HCl. In this last experiment, as in assays proper, only a small portion of the stearic acid used was extracted by the alkaloidal solvent.

These experiments prove that the influence exerted by the stearic acid does not exceed 0.05 c.c. of the HCl used in these assays corresponding to about 0.005 per cent. alkaloid on the basis of 20 grammes leaves, or about 0.01 per cent. on the basis of 10 grammes leaves; the interference is so slight that no correction was made in any assay in which stearic acid was used.

While stearic acid has not been tried in the assay of other drugs, there is no doubt but that it will prove quite successful in case the alkaloids can be titrated with hæmatoxylin as the indicator.

The results of the preceding work are given in tabular form (Table No. I), from which it will be seen that all assays were made in duplicate; where calculations involve such assays the average was used. Comparing the yield of alkaloids in the extracts with the calculated yield based upon the assay of the leaves and the yield of extract, it will be seen that the former exceeds the latter by from 20 to 33 per cent.; whilst the assay of the plasters ran a trifle higher than the calculated amount based upon the assay of the extract.

To ascertain the cause of the discrepancy between the theoretical and found percentages of alkaloid in the extract a series of assays were made with a purchased sample of powdered belladonna leaves manipulating as described, but changing the quantities of drug, solvent and water as shown in the following arrangement:

	<i>a</i>	<i>b</i>	<i>c</i> *	<i>d</i> *	<i>e</i>
Belladonna leaves	20 gm.	10 gm.	10 gm.	20 gm.	20 gm.
Ether	100 "	100 "	100 "	100 "	60 "
Chloroform	25 "	25 "	25 "	25 "	15 "
Ammonia water (10 p. c.) . .	10 c.c.	10 c.c.	5 c.c.	10 c.c.	10 c.c.
Water	40 "	20 "	15 "	30 "	10 "
Time of maceration	4 hrs.	4 hrs.	2 hrs.	2 hrs.	2 hrs.
Alkaloid found	0.414 p.c.	0.468 p.c.	0.418 p.c.	0.383 p.c.	0.399 p.c.

* A fifth portion of ether-chloroform of 20 c.c. used to ascertain if the extraction was complete; the residue from this extraction failed to cause an alkaline reaction with the indicator.

These results are very discordant and indicate that the time allowed for maceration (it should be recalled that the original process required but a half hour's maceration) and the quantity of aqueous solution compared with the quantity of alkaloidal solvent are important factors in the yield of alkaloid. This last factor being realized, and it is remembered that the first operation in the assay is practically the same as the third operation (removing the alkaloid from ammoniacal solution by the alkaloidal solvent), we can see where error is likely to be introduced. In the first operation it is *assumed* that the ether-chloroform used contains all of the alkaloid and that the aqueous solution is simply used to moisten and agglutinate the drug into lumps so as to assist separation of the alkaloidal solution; in the third operation three portions of solvent are used to complete the extraction of the alkaloid. It would be a parallel case if in the third operation a larger quantity of solvent were used and an aliquot portion of this taken to complete the assay. To prove what is stated, 20 grammes of the leaves were percolated with 300 c.c. alcohol (95 per cent.) in a manner to be described later (page 116), the percolate evaporated at a temperature not exceeding 50° C. and the extract obtained assayed, as previously described.

The drug exhausted by 95 per cent. alcohol was next percolated in the same manner with 200 c.c. of a menstruum, consisting of alcohol 2 volumes, and water 1 volume; the percolate was evaporated and assayed as stated above. Finally, the drug exhausted with the

diluted alcohol was percolated with 100 c.c. distilled water and treated as above. The results were as follows:

	95 p.c. Alcohol.	Dil. Alcohol.	Water.	Total.
Extract	13.40 p.c.	14.45 p.c.	8.95 p.c.	36.80 p.c.
Alkaloid	0.391 "	0.064 "	none	0.455 "

The total yield of alkaloid obtained in this experiment was exceeded only by (b) of the preceding series; this experiment also gives an idea of the difficulty of extracting belladonna leaves with 95 per cent. alcohol.

To determine to what extent the 20 c.c. of diluted ammonia used in the assay of the extract retained alkaloid, two portions of 20 grammes each were percolated, as described on page 116, with 300 c.c. of a menstruum, consisting of 2 volumes alcohol and 1 volume water and the *entire* quantity of extract taken for the assay (method page 116).

	Extract.	Alkaloid.
A.	26.3 per cent.	0.4839 per cent.
B.	27.7 " "	0.4891 " "

The results indicate that the assays of the extracts as previously made are a little low, and corroborate the statements made as to the results attending the taking of an aliquot portion.

Another possible source of error, due to the solubility of the ether-chloroform in the aqueous solution and of water in the ether-chloroform, causing alteration in weight and volume of the alkaloidal solution, has not been separately considered. It therefore became necessary to again assay the three varieties of leaves and also the extracts prepared from them; moisture determinations were also made in the leaves, but not in the case of the extracts, as these had been placed in well-closed containers as soon as possible after their manufacture, and for these assays portions were taken from the center of the mass.

ASSAY PROCESS FOR BELLADONNA LEAVES AND EXTRACT.

Moisture.—Determined in about 2 grammes at 100° C.

Assay proper.—A small, slightly conical percolator about 8 inches long and 1 $\frac{1}{4}$ -1 $\frac{1}{2}$ inches wide, such as are used in certain continuous extraction apparatus, is connected with a piece of rubber tubing (about 12 inches long) having a small piece of glass tubing (about 2 inches long) attached, for the purpose of regulating the dropping of the percolate; this can also be regulated by use of a brass spring.

Into this percolator is first introduced a plug of cotton of such size as to practically fill up the neck of the percolator; place 20 grammes of the powdered leaves in the percolator, add 50 c.c. menstruum (alcohol 2 volumes, water 1 volume) and stir with a heavy iron wire until a homogeneous mixture results and in such a manner that the air-bubbles are brought as completely as possible to the surface; rinse the wire and sides of the percolator with 25 c.c. of the menstruum and allow to macerate for 5-6 hours or over night. Percolation is then allowed to slowly proceed until about 75° C. percolate are obtained when the percolation is stopped for a 5-6 hours' maceration; percolation and maceration alternate each other until 300 c.c. menstruum have been used; by evaporating the percolate in a weighed porcelain dish (about 150 c.c. capacity) until the extract could be no longer stirred with a glass rod, the yield of extract was obtained.

From this point on the assay of the leaves and of belladonna extract are identical; the extract in the dish obtained from the 20 grammes leaves (or about 5 grammes belladonna extract weighed into a beaker) are disintegrated by using 10 c.c. acidulated water (2 c.c. H_2SO_4 , U.S.P., to make 500 c.c.) and stirring with a glass rod; when accomplished the mixture is transferred to a separatory funnel and the vessels rinsed with several small portions of acidulated water of 2 c.c. each; then dissolve and remove to the separator chlorophyll and other substances insoluble in the acid water by using three portions of 10 c.c. each of a mixture of ether-chloroform (ether 4 parts and chloroform 1 part by weight); now rinse the vessels (dish or beaker) with sufficient acidulated water to make the total quantity of this 25 c.c., adding this to the liquids in the separator, and finally add 20 c.c. more of the ether-chloroform. Agitate thoroughly and, after separation of the liquids, allow the acid solution to run into a beaker; repeat with 15, 10 and 5 c.c. acidulated water. Collect the first three portions together, reserving the last portion to rinse the beaker containing the first portions; clean the separator, introduce the acid solutions, finally rinsing the beaker with 5 c.c. water, add 25 c.c. ether-chloroform (ether 2 parts, chloroform 4 parts by weight; this mixture was found preferable in those extractions in which stearic acid was necessary to break up emulsions) and agitate thoroughly; after separation transfer the ether-chloroform solution to a smaller separator (about 100 c.c. capacity) and repeat

the extraction with 15, 10 and 5 c.c. of the solvent; while this last portion is separating, run the other portions through a small filter into a clean, dry flask of about 120 c.c. capacity; rinse the smaller separator with the last extraction and transfer to the filter; the stem of the larger separator is rinsed with 5 c.c. of the solvent and this portion used to again rinse the smaller separator before transferring to the filter; now rinse the stem of the smaller separator with a few cubic centimetres of the solvent, allowing this portion to run on the filter, and wash the filter and funnel with several small portions of solvent. Any aqueous solution transferred to the smaller separator should be prevented from getting on the filter and the latter should be covered as much as possible to prevent evaporation of the solvent. Should an emulsion form at any stage of the extraction of the alkaline solution, add a small fragment of stearic acid and manipulate as described on page 112.

Distil off the solvent on a water-bath, warm until the odor of chloroform disappears, dissolve the residue in 5 c.c. ether, evaporate, redissolve residue in 5 c.c. ether, evaporate and heat until the odor of ether disappears; dissolve in 8 c.c. neutral alcohol, add 30 c.c. water and 3 drops hæmatoxylin solution and titrate with standardized HCl to the disappearance of any red shade or the formation of a pure yellow color.

In this assay process in which so much inert matter is present, it frequently happens and particularly in the absence of stearic acid that a pulverulent yellow precipitate separates from the alkaline solution and must be transferred to the smaller separator and from there to the filter, where it impedes filtration.

The alkaloidal residue generally has a light greenish color, but this, as a rule, does not interfere with the end reaction in the titration; in only two out of fourteen assays was there any difficulty in the titration.

It is unnecessary to make more than the following comments upon this assay process: it is not a quick process; it has for its object the complete extraction of the alkaloids from a definite weight of the drug or preparation; one of its most important uses will be the determination of the value of any shorter assay process.

The results on page 120 were obtained by this assay process:

TABLE No. I.

	LEAVES FOR ASSAY.		LEAVES FOR EXTRACT.		EXTRACT.				PLASTER.		
	Moisture. (1)	Alkaloid Found. (2)	Moisture. (3)	Alkaloid Calc. from (1), (2) and (3). (4)	Yield. (5)	Moisture. (6)	Alkaloid Found. (7)	Alkaloid Calc. from (4) and (5). (8)	Loss in Making. (9)	Alkaloid Found. (10)	Alkaloid Calc. from (7) and (9). (11)
	Per Cent.	Per Cent.	Per Cent.	Per Cent.	Per Cent.	Per Cent.	Per Cent.	Per Cent.	Per Cent.	Per Cent.	Per Cent.
Variety of Belladonna Leaves.											
English Cultivated, Allen's .	9.05	<i>a</i> 0.410 <i>b</i> 0.409 Average 0.4095	9.55	0.4072	30.488	16.04	<i>a</i> 1.7647 <i>b</i> 1.7680 Average 1.76635	1.3356	1.05	<i>a</i> 0.3576 <i>b</i> 0.3576 Average 0.3570	0.570
German Cultivated.	9.15	<i>a</i> 0.396 <i>b</i> 0.392 Average 0.394	9.23	0.3936	32.20	17.24	<i>a</i> 1.5004 <i>b</i> 1.4705 Average 1.48545	1.2223	1.07	<i>a</i> 0.305 <i>b</i> 0.305 Average 0.303	0.3147
German Wild.	9.43	<i>a</i> 0.316 <i>b</i> 0.321 Average 0.3185	9.98	0.3165	26.514	15.35	<i>a</i> 1.585 <i>b</i> 1.533 Average 1.559	1.1937	0.94	<i>a</i> 0.3156 <i>b</i> 0.3156 Average 0.3147	0.3147

TABLE No. II.

	LEAVES FOR ASSAY.		LEAVES FOR EXTRACT.		EXTRACT			PLASTER.			
	Moisture.	Alkaloid Found.	Moisture.	Alkaloid Calc. from (1), (2) and (3).	Yield.	Moisture.	Alkaloid Found.	Alkaloid Calc. from (4) and (5).	Loss in Making.	Alkaloid Found.	Alkaloid Calc. from (7) and (9).
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
	Per Cent.	Per Cent.	Per Cent.	Per Cent.	Per Cent.	Per Cent.	Per Cent.	Per Cent.	Per Cent.	Per Cent.	Per Cent.
Variety of Belladonna Leaves.											
English Cultivated, Allen's.	8.40	<i>a</i> ^s 0.5996 <i>b</i> 0.6040 Average 0.6023	9.55	0.5947	30.488	16.04	<i>a</i> 1.551 <i>b</i> ^s 1.828 Average 1.8395	1.950	1.05	<i>a</i> ^s 0.3576 <i>b</i> ^s 0.3576	0.371
German Cultivated	7.60	<i>a</i> ^s 0.5155 <i>b</i> 0.5050 Average 0.5103	9.23	0.5013	32.20	17.24	<i>a</i> ^s 1.598 <i>b</i> ^s 1.585 Average 1.592	1.5568	1.07	<i>a</i> ^s 0.305 <i>b</i> ^s 0.305	0.3218
German Wild	6.80	<i>a</i> ^s 0.4997 <i>b</i> ^s 0.4997 Average 0.4997	9.58	0.4816	26.514	15.35	<i>a</i> 1.6998 <i>b</i> ^s 1.7133 Average 1.7065	1.8164	0.94	<i>a</i> ^s 0.3156 <i>b</i> ^s 0.3156	0.3445

^s Stearic acid used.

	Leaves.			Extract.
	Moisture. Per Cent.	Extract. Per Cent.	Alkaloid. Per Cent.	Alkaloid Per Cent.
English, cultivated (Allen's) .	8.40 {	a. 33.55 b. 32.55	a. 0.5996 b. 0.6054	a. 1.8510 b. 1.8280
German, cultivated	7.60 {	a. 36.55 b. 36.30	a. 0.5155 b. 0.5050	a. 1.5980 b. 1.5850
German, wild	6.80 {	a. 27.00 b. 27.45	a. 0.4997 b. 0.4997	a. 1.6998 b. 1.7133

In Table No. II we have these results substituted for the corresponding ones of Table No. I. A comparison of these two tables shows a most notable increase in the assay of the leaves by the finally adopted method which removes the discrepancy shown in (7) and (8) of Table No. I.

In the assay of the extracts the final method shows slightly higher results, averaging about 0.1 per cent. alkaloid; this makes the calculated percentage of alkaloids in the plaster a little higher than that found, a result naturally to be expected.

The yield of extract obtained from the leaves, 26.5 to 32.2 per cent., is much higher than the yield usually published, 20 to 24 per cent.; this is no doubt due to the use of more menstruum, about 6 volumes having been used for 1 part by weight of the drug; in those cases in which the extract obtained in the assay of leaves was weighed, there was used about 15 volumes menstruum for 1 part by weight of the drug, and it will be noted that the percentage of extract was increased (see top of page). By comparing the percentage of alkaloid calculated for the extract from the assay of the leaves and that found in the extract the possibility of incomplete extraction of the alkaloid is indicated in the cases of the English cultivated and the German wild leaves.

A study of the results of Table I indicates that it is possible, in assaying leaves by a process giving low results and assaying an extract by a process which very closely indicates the true alkaloidal percentage of the same, to obtain figures which apparently confirm total extraction of the leaves with a yield of say about 20 per cent. extract.

An investigation is now wanted having for its object the determination of the quantity of menstruum needed for the extraction of belladonna leaves with assays of the preparations, so that the relation between yield of extract and alkaloidal percentage can be ascertained.

SYRUP OF HYDRIODIC ACID.

BY F. W. HAUSSMANN.

Research Committee E, Pharmacopœia Revision.

Few official preparations have been subjected to as much adverse criticism as this syrup.

The objections are based chiefly on chemical grounds, and suggestions to omit it from the Pharmacopœia or to recommend recent preparations from a solution of hydriodic acid have frequently been published in various journals.

In view of the popularity enjoyed in many localities, acquiescence to such demands would be ill-timed and unjust, and the policy of condemning a preparation because changes take place which with due precaution may in a measure be prevented, or, after taking place, remedied with but little difficulty or cost, with no impairment of appearance or diminution in strength, would prove only beneficial to manufacturers.

A result of its omission from the Pharmacopœia would be the liability of physicians to specify private makes. Under the presence of superior stability such preparations would displace the official article, while such claims are in no manner either substantiated or justified.

Syrup of hydriodic acid, prepared according to official directions, is equal to any similar preparation in the market, may be confidently recommended as such, and the material decrease in cost by self-manufacture should induce every pharmacist to prepare his own syrup.

PREPARATION.

The Pharmacopœia directs the hydriodic acid for the syrup to be prepared by double decomposition between potassium iodide and tartaric acid, preventing the liberation of free iodine by the addition of potassium hypophosphite.

Diluted alcohol is employed to prevent solution of the precipitated potassium bitartrate.

The writer has no substitute to offer in preference to this method.

The formula of the Pharmacopœia of 1880, which directed the acid to be prepared by the action of hydrogen sulphide upon an alcoholic solution of iodine, was deservedly unpopular, and the pre-

ference universally given to the present process is in the main due to its ready manipulation.

The Pharmacopœia, in furnishing its working formulas, must primarily consider the ease with which they are manipulated.

Difficult processes are seldom if ever attempted by the average retail pharmacist, and are as a rule profitable to manufacturers.

Preparations should also be directed to be made from compounds easily obtainable, in active use and as inexpensive as possible.

Chemicals, which are not used for any purpose but as ingredients in a preparation, should not be ordered, if they can be replaced by those more frequently employed.

These thoughts occurred to the writer, while manipulating various formulas for this preparation.

Syrup of hydriodic acid, as prepared by the official process, will contain a small quantity of potassium bitartrate.

The insignificant amount present is unobjectionable, but with the view of avoiding the same, the writer prepared hydriodic acid by double decomposition between barium iodide and sulphuric acid, but foreseeing the objection to the limited use of the barium salt, this process was abandoned.

For this and other reasons it must be deemed advisable to retain the present official process.

But in several particulars it is open to improvement.

The amounts of potassium iodide and tartaric acid may first be considered.

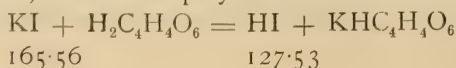
The Pharmacopœia orders 13 grammes of the former and 12 grammes of the acid to be used in preparing 1,000 grammes of the syrup.

These quantities, in the writer's experience, are insufficient to furnish a 1 per cent. syrup.

In an examination of a number of specimens of the syrup, prepared strictly according to official directions, the writer found the same to fall short of the official requirement, when estimated with decinormal silver nitrate V. S.

This is due to the fact, that the official quantities of potassium iodide and tartaric acid are calculated too close.

To demonstrate this point, the following calculation, first with potassium iodide, must be employed :



165.56

127.53

As 1,000 grammes of the syrup contain 10 grammes of hydriodic acid, the following proportion gives the amount of potassium iodide required for this quantity:

$$165.56 : 127.53 :: x : 10.$$

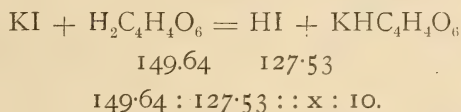
$x = 12.98$, this quantity being calculated as absolute potassium iodide.

This salt, as found in commerce is never absolute, and the Pharmacopœia allows impurities to the amount of 0.5 per cent.

If to the above calculated figure (12.98) we add this percentage, the amount of iodide necessary must be $12.98 + .065 = 13.045$ grammes, a quantity already in excess of the one directed by the Pharmacopœia.

Few commercial iodides, however, show this percentage.

A similar condition also exists in the case of tartaric acid. The calculation, upon which the official quantity is evidently based, may be expressed as follows:



$x = 11.73$, the amount calculated to decompose exactly 12.98 grammes of absolute potassium iodide.

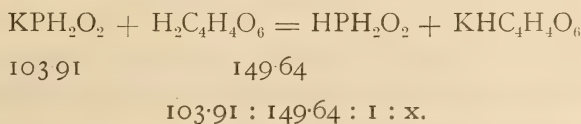
It may be questioned if the potassium hypophosphite employed in the process, exists as salt or as hypophosphorous acid.

The hypothesis that the latter is the case, is probably correct.

Some authors who have experimented with the syrup, recommend an addition of hypophosphorous acid to that already present in the syrup.

To completely decompose both potassium iodide and hypophosphite, the amount of tartaric acid directed by the Pharmacopœia is insufficient.

For the decomposition of the hypophosphite by means of tartaric acid we have the following equation:



$x = 1.44$ grammes of tartaric acid required to decompose 1 gramme of potassium hypophosphite.

From the above figures the deduction must be made, that, to obtain a 1 per cent. syrup of hydriodic acid, the quantities of potassium iodide and tartaric acid must be increased.

The following table records an examination of specimens of syrup of hydriodic acid obtained from various sources:

EXAMINATION OF COMMERCIAL SPECIMENS OF SYRUP OF HYDRIODIC ACID BY
RESIDUAL TITRATION WITH $\frac{N}{10}$ KSCN SOLUTION.

Color.	Number of c.c. $\frac{N}{10}$ Ag NO ₃ Solution consumed to precipitate 12.753 grammes of syrup.	Percentage of HI.	Remarks.
1. Brown	9.4 c.c.	.94	
2. Straw	8.7	.87	
3. Slightly straw . .	9.0	.9	contains glycerin
4. Brown	9.1	.91	
5. Amber	7.8	.78	
6. Colorless	10.1	.101	
7. Brownish	6.5	.65	
8. Colorless	10.9	.109	contains glycerin
9. Amber	9.2	.92	
10. Straw	8.4	.84	grape sugar deposit.
11. Yellowish	7.6	.76	
12. Colorless	9.0	.9	U.S.P. syrup
13. Yellow	9.2	.92	heavy deposit in syrup
14. Colorless	10.2	1.02	} sp. gr. 1.318
15. Colorless	10.1	1.01	

The process directed of washing the precipitated potassium bitartrate with diluted alcohol directs attention to another point, namely, the wasteful method of removing the hydriodic acid.

If the directions of washing the precipitate until the filtrate gives a slight precipitate when dropped into silver nitrate T. S., are followed, it will be found that considerable diluted alcohol is necessary, and a doubt is also left in the mind of the operator.

Several conditions furnish the reason.

In using the official quantities of potassium iodide and tartaric acid, a thorough washing is necessary to even approximately furnish a syrup of the required strength.

The removal of the hydriodic acid is not as easily accomplished

as supposed, the writer having found in one instance that over 150 c.c. of diluted alcohol were required in preparing 1,000 grammes of the syrup, until application of starch paste and chlorine water showed its complete removal.

If the present quantities and directions are to be retained, this reaction should be substituted for the silver nitrate test, as being more delicate and a better identity test.

Potassium bitartrate is slightly soluble in diluted alcohol and also precipitates silver nitrate T. S.

Should this direction be retained, the reading should be as follows: Until a drop or two, allowed to fall into silver nitrate T. S., produces but a slight precipitate, *almost* completely soluble on the addition of nitric acid.

Acting on the necessity of an increase in the quantities of potassium iodide and tartaric acid, a number of trials were made.

If the iodide is increased to 13.5 grammes and the acid to 12.5 grammes, the latter, however, being still insufficient to decompose all the hypophosphite with formation of the corresponding acid, a syrup can be prepared which contains 1 per cent. or over of hydriodic acid.

The washing of the precipitated potassium bitartrate until the acid is completely removed will be unnecessary, filtration to a definite volume removing a sufficient quantity to fulfill the official requirement.

Evaporation of the filtrate can also be dispensed with, the small percentage of alcohol not interfering with the stability of the syrup.

The syrup of the Pharmacopœia of 1880 contained 8 per cent. of alcohol, and the presence of less than 4 per cent. ought not be objectionable.

If evaporation of the hydriodic acid filtrate is avoided, the suggestion to dissolve the sugar directly in the properly diluted acid solution may perhaps be considered.

The increase in time necessary for solution will outweigh the trouble and loss occasioned by the present process of evaporation to a definite weight.

The following formula, based on the experiments described, has been found to yield a satisfactory syrup, answering to the official requirements:

Syrupus Acidi Hydriodici,
Syrup of hydriodic acid.

A syrupy liquid, containing about 1 per cent. by weight of absolute hydriodic acid (HI, 127.53), or about 1.3 grammes in 100 c.c.

	Grammes.
Potassium iodide, thirteen and one-half grammes	13.5
Potassium hypophosphite, one gramme	1
Tartaric acid, twelve and one-half grammes	12.5
Sugar, 625 grammes	625
Diluted alcohol	
Water, of each a sufficient quantity to make 1,000 grammes . . .	1,000

Dissolve the two potassium salts in 15 c.c. of water, and the tartaric acid in 25 c.c. of diluted alcohol.

Mix the two solutions in a vial, shake it thoroughly and place it in ice water for half an hour, occasionally shaking. Filter the mixture through a small, rapidly-acting white filter into a bottle graduated to 75 c.c. Carefully allow the liquid to drain and wash the bottle in which the mixture was prepared and the filter repeatedly with small portions of diluted alcohol, allowing each portion to drain separately. When the desired amount of filtrate is obtained, dilute it with 275 c.c. of water, add the sugar and dissolve it by agitation without heat. Finally add a sufficient quantity of water to make the product weigh 1,000 grammes.

Strain if necessary.

If it would be deemed advisable to simply dilute the acid solution with syrup, such directions can be substituted for the more tedious method of dissolving the sugar by agitation. The specific gravity of the syrup, prepared by the latter method, closely approximates that of simple syrup, about 1.315 to 1.320.

PRESERVATION.

The Pharmacopœia gives no specific directions for preservation of the syrup.

Due to this fact it is often exposed to all light and temperature conditions.

In a previous paper the writer dwelt upon the discoloration occurring in this and other acid syrups.

The influence of summer heat was specifically mentioned to be of material importance in the production of this change.

The Pharmacopœia should give the following directions for preserving the syrup.

Syrup of hydriodic acid should be kept in well-stoppered bottles in a cool and dark place.

Some authors recommend the addition of glycerin to the syrup, with the object of preventing discoloration.

One writer recommends complete substitution of glycerin for syrup.

Glycerin will, however, not prevent the syrup from becoming discolored, as shown in numbers of specimens prepared by the writer.

Other acid syrups, to which glycerin is added to insure greater stability, will show similar changes.

The addition of glycerin to syrup of hydriodic acid gives rise to another objectionable feature, which, if found true, will absolutely exclude its use.

Hydriodic acid readily forms substitution products with organic hydroxyl compounds with formation of the corresponding iodide. From the triatomic alcohol glycerin ($C_3H_5(OH)_3$), allyl iodide (C_3H_5I) is produced by the action of concentrated hydriodic acid. If a glycerin substitute for the official syrup is prepared, it will be found that a peculiar leek-like odor is developed. Syrups in which a partial glycerin substitution is made show a like result, which in the case of syrups prepared with sugar alone was never observed.

To further investigate this point would form an interesting subject for research.

The peculiar odor described, noticeable only in syrups of hydriodic acid containing glycerin, make the presence of allyl iodide extremely probable.

The action of hydriodic acid upon alcohols may also be used as the basis for objection to the presence of ethylic alcohol in the syrup, as, under similar conditions, ethyl iodide may perhaps be formed.

No physical evidence of such a presence is, however, found either in diluted alcoholic solutions of the acid, standing for about one year or in specimens of the syrup, containing a small alcoholic percentage.

With the object of preventing discoloration some authors suggest recent preparations by diluting a concentrated solution of hydriodic acid with simple syrup.

A 10 per cent. acid solution is recommended, and a commercial article.

Experiments conducted by the writer show that solutions of hydriodic acid, in the presence of hypophosphorous acid, keep almost indefinitely without liberating iodine.

A disadvantage to be considered is the liability of discoloration

of the syrup taking place in the hands of the patient. Retail pharmacists are well acquainted with the popular suspicions in such instances.

DESCRIPTION.

The descriptive features, as presented by the Pharmacopœia, are open to criticism as well as improvement.

The official description is as follows: A transparent, colorless or not more than pale straw colored liquid, odorless and having a sweet, acidulous taste.

After stating the identity test with starch paste and chlorine water, the following is demanded: Not more than a faint bluish tint should be produced in the syrup by starch T. S. alone (limit of free iodine).

In a number of examinations of colored specimens the writer found free iodine in no instance.

The discoloration may be artificially produced by heating the syrup, and a perfectly colorless specimen may thus be turned reddish brown in ten to fifteen minutes, with no evidence of free iodine on cooling.

The statement that colored syrups of hydriodic acid may be restored by heating is not substantiated. On the contrary, they turn still darker.

Colored syrups do not lose their effect and determinations show that the percentage of hydriodic acid remains constant. A number of examinations revealed the fact that syrups, both at the time of preparation and after discoloration, show identical percentages.

RESTORATION.

Of considerable importance to the pharmacist is the restoration of the discolored syrup to its original condition.

This may be accomplished by means of animal charcoal, as pointed out by Mr. O. A. Rouillon.

Purified animal charcoal must be employed, as commercial bone-black contains phosphates, which dissolve in the acid.

To determine if animal charcoal also has the power of absorbing hydriodic acid, a number of specimens of the syrup were examined as to their acid percentage before and after decolorization.

In all cases no loss of acid was found, and restoration of the discolored syrup by these means is perfectly legitimate.

The proportion of animal charcoal is directed by Mr. D. Cameron to be $\frac{1}{2}$ ounce of animal charcoal to the pint of syrup.

In the writer's experience the amount necessary is dependent upon the degree of discoloration, very dark syrups requiring greater amounts.

The following process has been found to give satisfactory results:

Mix the discolored syrup with from 3 to 5 per cent. its weight of powdered purified animal charcoal in a bottle, allow to stand from two to three hours with frequent agitation and filter.

Should the filtrate not be perfectly colorless, an additional amount of charcoal must be used.

PERCENTAGE ESTIMATION.

The Pharmacopœia gives the following directions for valuation:

If 32 (31.88) grammes of the syrup be exactly neutralized by ammonia water and then mixed with two drops of potassium chromate T. S., it should require about .25 c.c. of decinormal silver nitrate V. S. to produce a permanent red tint (corresponding to about 1 per cent. of absolute hydriodic acid). Extrême care must be used in neutralizing the syrup with ammonia water.

Theoretically calculated, only .425 grammes of the official aqua ammoniæ are required to exactly neutralize the stated quantity.

The end of the reaction depends upon the formation of red silver chromate.

Errors may be made either in the case of incomplete neutralization or trifling excess of ammonia.

Silver chromate is soluble both in diluted nitric acid and ammonia water.

In the case of incomplete neutralization, addition of silver nitrate V. S., while precipitating silver iodide, will cause a corresponding amount of nitric acid to be liberated, which redissolves the silver chromate formed with destruction of the red color.

An excess of ammonia water produces allied results and errors amounting to several cubic centimetres of the $\frac{N}{10}$ silver nitrate V. S. may result therefrom.

A slight error may also take place by the presence of potassium bitartrate in the syrup.

As a substitute for the chromate titration, residual titration of $\frac{N}{10}$ silver nitrate V. S. with decinormal potassium sulpho-cyanate V. S. in the presence of nitric acid and ferric ammonium sulphate T. S. may be employed.

The advantages of this process are the following :

- (1) Smaller amounts of the syrup and decinormal silver nitrate V. S. are required for the operation.
- (2) The liability of error, as incurred in the neutralization with ammonia water, is diminished.
- (3) The presence of potassium bitartrate does not interfere with an accurate estimation.
- (4) The process is manipulated more rapidly.

Comparison with the chromate titration show the results to agree closely.

The following process, based upon the official method for the valuation of syrup of iodide of iron, may therefore be substituted for the present official method :

If 12.76 grammes (12.753 grammes) of the syrup and 15 c.c. of water be introduced into a flask and the liquid mixed successively with 11 c.c. of decinormal silver nitrate V. S. and 5 c.c. each of diluted nitric acid and ferric ammonium sulphate T. S., it should not require more than 1 c.c. of decinormal potassium sulpho-cyanate V. S. to produce a reddish-brown tint, which persists after shaking (corresponding to at least 1 per cent. of hydriodic acid).

THE ANALYSIS OF COMMERCIAL VERATRINE.

PART I.

BY GEORGE B. FRANKFORTER AND LEVI B. PEASE.

The study of the alkaloids of the various species of *veratrum* began in 1819, when Pelletier and Caventou¹ obtained from the seed of *Veratrum sabadilla*, a substance which possessed remarkable alkaloidal properties. This substance they called "Veratria," and it was known and sold under that name in pharmacy. A very similar substance was obtained a year later from *Veratrum album*. Experiments showed later, however, that the so-called "veratria" was a mixture of several alkaloids and methods for their separation

¹ *Ann. Chim. et de Phys.* (II), 14, 69.

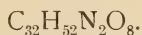
were subsequently given. One of these substances, perhaps the most abundant, was called veratrine. Unfortunately, these latter experiments, resulting in the isolation of these new bases, only led to confusion, for not until recently was it possible to obtain samples of the same name, with the same physiological and chemical properties. This confusion was largely due to the fact that several different substances were known under the name of veratrine. The introduction of the so-called "Merck Veratrine" has changed matters to some extent, although samples of this base have been found to vary considerably, and samples from the different factories were found to vary widely.

One of the chief causes of this variation is the extreme difficulty with which these alkaloids crystallize, thus excluding one of the most important means of purification. Another, and the chief cause, is due to the fact that several of these substances have been known by the common name veratrine.

Couerbe,² in his work on the separation of the alkaloids in "veratria," isolated three distinct substances, two of which were carefully studied. The most important one he called veratrine, and gave to it the formula,



Merck,³ in an examination of the substances obtained by Couerbe, found that when one of these substances was dissolved in dilute alcohol and allowed to evaporate slowly, a crystalline substance was obtained, to which he gave the formula,



This was likewise called veratrine.

Wiegelin,⁴ in a study of *Veratrum album*, isolated two other alkaloids besides veratrine, to which he gave the formula,



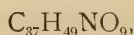
Wright and Luff⁵ examined the crude alkaloid, and likewise isolated three distinct bases, giving to the substance which they called veratrine, the formula,

² *Ann. Chim. et de Phys.* (II), 52, 367.

³ *Ann. d. Chem. und Pharm.*, 95, 200.

⁴ *N. Jahrb. Pharm.*, 37, 94.

⁵ *Jour. Chem. Soc.*, London, 33, 338.



and to a second, which was obtained by a method not unlike that used by Couerbe for the separation of sabadilleine, they gave the name cevadine. To this substance, they gave the formula,



Later experiments showed that cevadine was the most abundant of the three bases. It retained the name from the fact that it formed cevadic acid.

In as much as recent experiments have shown cevadine to be identical with the common veratrine, it would appear that no less than three distinct substances have been known as veratrine, any one of which might be taken as official veratrine. A number of examinations of commercial veratrine were made, and in each case the predominant base was the cevadine, so carefully described by Wright and Ahrens. Not a single case showed more than a small per cent. of either of the other substances known as veratrine.

SUBSTANCE INSOLUBLE IN ETHER.

In making these determinations, all of the different samples which could be obtained were examined. While the variation, in certain cases was considerable, the greater part was found to be the so-called Wright cevadine. The melting-point was found to vary slightly, although the general physical and chemical properties were comparatively uniform. In determining the solubility, however, it was found that when treated with ether, a small quantity of undissolved substance remained, the major part forming a colorless solution. This insoluble substance was filtered off and examined. It was an amorphous powder in each case, with a melting-point of 184° to 285° C. It did not fully answer the description of either of the above mentioned bases. The following determinations give the respective per cents. of the insoluble substance with their respective melting-points :

Name of the Manufacturer.	Merck.	Tromsdorff.	Powers & Weightman.	Mahlenkrodt.
Insoluble substance	0.86	3.89	3.6	3.26
Melting-point	184°	285°	206°	231°

It is evident, from the wide range of melting-points, that the insoluble substances from these different samples varies widely. They are at present under examination.

The soluble parts, both from melting-point and from analyses, were found to be identical with Wright cevadine. The following is a comparison of melting-points and analyses:

Calculated for $C_{32}H_{49}NO_9$	Merck.		Tromsdorff.	Powers & Weightman.	Mahlenkrodt.
	No. 1.	No. 2.			
C = 64.96	64.6	64.5	64.72	64.74	64.82
H = 8.29	8.4	8.6	8.36	8.19	8.41
Melting-point	148°		147°	148°	148°

The above samples were of recent preparation. Two samples which had been prepared some years ago, were on examination found to resemble the "veratria" of Caventou, and were, as hitherto found, a mixture of several substances.

From the above analyses, it is evident that the principal part of veratrine in the market at the present time is identical with the substance formerly known as cevadine. In fact, the physical and chemical properties correspond exactly with those given by Wright for cevadine. While there is little doubt that the cevadine of Wright is identical with the so-called "Merck veratrine" and the veratrine of the other firms above mentioned, some of the true cevadine has been obtained and is now in comparison with the common veratrine.

PROXIMATE ANALYSIS OF THE LEAVES OF LIATRIS ODORATISSIMA.

BY CHARLES FALKENHAINER.

Contribution from the Chemical Laboratory of the Philadelphia College of Pharmacy. No. 181.

Liatris odoratissima, Michx. is a plant which grows in southern United States. It is commonly called deer's tongue, southern vanilla and vanilla plant. These names were probably suggested by certain characters of the leaves of the plant. The radical leaves are obovate-spatulate, obtuse, about seven-veined, narrowed below; the stem leaves are oval or oblong and clasping at the base. All the leaves are rather fleshy, pale green, and smooth, and after drying have a very agreeable odor, which is likened to that of the vanilla bean. This odor is due to coumarin as was pointed out by Prof. William Procter, Jr., in the AMERICAN JOURNAL OF PHARMACY, 1859, page 557.

The odorous principle is present in considerable quantity, and is frequently noticeable in crystals upon the surface of the leaves.

The leaves are said to be very largely employed in the southern part of the United States to flavor tobacco, and to preserve wearing apparel from moths. Their agreeable and persistent odor renders deer's-tongue leaves also serviceable in the preparation of sachet powder and other articles of perfumery, as suggested by Dr. A. W. Miller in this JOURNAL, 1875, page 116.

The parts of the plant seem to have never been systematically analyzed. For the purposes of this study of the proximate composition of the leaves, a portion of the finely-ground material was exhausted with solvents in the succession in which their extracts are hereinafter described. The percentages given are based on the air-dried, powdered leaves.

Petroleum Ether Extract.—This extract, as obtained by spontaneous evaporation of the solvent at the room temperature and subsequent drying over sulphuric acid, amounted to 3.25 per cent. of the leaves. It exhibited a distinctly, crystalline principle. When dried to a constant weight at 110°, the extract lost weight to the extent of 0.3 per cent. of the leaves. There appeared to be a loss of crystalline principle during this treatment. The extract consisted of fatty substances soluble in hot absolute alcohol, and a wax which was also soluble in hot absolute alcohol, but redeposited on cooling. This wax was also soluble in chloroform and carbon disulphide, but insoluble in glacial acetic acid and cold alcohol. The crystalline principle previously referred to remained dissolved in the alcohol upon the cooling of the solution from which the wax deposited. It was afterwards separated from the accompanying fats by recrystallization from cold alcohol. This principle proved to be coumarin and will be subsequently treated of in this paper.

Ether Extract.—The leaves were next treated with official ether, which extracted 4.26 per cent. of their weight of a brownish-black, amorphous mass. This extract was treated with hot water, which dissolved very little substance, but acquired an acid reaction.

The aqueous solution so obtained gave reactions as follows:

Ferric chloride, greenish color.

Lead acetate, no visible change.

Fehling's solution suffered no reduction.

Fehling's solution suffered no reduction after the aqueous solution had been boiled with acid.

Another portion of the said aqueous solution was agitated with ether. This solvent, upon separation and evaporation, left a crystalline residue. This eventually proved to be coumarin.

That part of the ether extract which was insoluble in hot water, was soluble both in hot alcohol and acetone. The alcoholic solution gave a black precipitate with alcoholic solution of ferric chloride, and a green precipitate with alcoholic solution of lead acetate. When a third portion of the alcoholic solution was poured into water a precipitation of the dissolved substances took place. Besides the coumarin and the resinous matters indicated by the last three tests, the ether extract contained some wax.

Absolute Alcohol Extract.—This extract amounted to 5.74 per cent. of the leaves. It was treated with hot water, which dissolved everything, but a little chlorophyll. The aqueous solution had a very slightly acid reaction. Fehling's solution applied to it, failed to show the presence of glucose, but after boiling the aqueous solution with acid, this reagent was reduced to an extent indicating 0.43 per cent. of cane sugar. The aqueous solution produced a green color with ferric chloride. The extract contained no inorganic matter.

Water Extract.—The organic solids of the cold water extract of the leaves represented 42.96 per cent. of their weight. Alcohol added to the solution of the water extract in the proportion of five volumes of the former to one of the latter precipitated 17.28 per cent. of mucilage and albuminous matters. 4.75 per cent. of glucose was indicated in this extract; cane sugar was absent. Tannin too was absent, as was also shown by tests applied to a cold water infusion of a fresh portion of the leaves.

Alkaline Water Extract.—When the residue of the leaves from the treatments with the foregoing solvents was treated with water made distinctly alkaline with sodium hydrate, 8.44 per cent. of organic extract was removed. This amount included 2 per cent. of mucilaginous matter, which was precipitated when the solution was acidified with acetic acid, and then mixed with five times its volume of alcohol.

Acidulated Water Extract.—Water acidulated with hydrochloric acid was next applied to the residue of the leaves. This solvent dissolved 2.59 per cent. of organic matter. Not more than traces of the dissolved substances were precipitated by making the solu-

tion alkaline with ammonium hydrate, or by mixing the alkaline liquid so obtained with several volumes of alcohol.

Starch was not found in the material examined.

A portion of the powdered leaves lost 6.1 per cent. of its weight upon complete drying at 110°. This loss in the presence of the coumarin must be taken as indicating only approximately the moisture in the air-dried leaves.

The residue from drying left upon ignition 8.75 per cent. of ash. About 70 per cent. of this ash was soluble in water. The water solution had an alkaline reaction, and contained sodium, potassium, sulphur trioxide and chlorine. The remainder of the ash, with the exception of a trace of silica, dissolved in hydrochloric acid with effervescence, showing carbonates. The hydrochloric acid solution contained calcium, magnesium, aluminum and phosphoric oxide.

Coumarin.—As already stated, Professor Procter pointed out the presence of coumarin in this plant. As he did this from the observation of certain chemical behaviors which he found the substance to possess, it was thought desirable, in this connection, to make an elementary analysis of the substance with the view of adding to his results. For this purpose a quantity of the ground material was extracted with petroleum ether, the solvent removed by evaporation at ordinary temperature, and the crystalline matter of the residue repeatedly recrystallized from hot alcohol until the melting-point of the crystals was constant. The constant point was found to be between 66° and 67° C. This purified material was submitted to elementary analysis, with the following result :

	Per Cent.	Calculated for Coumarin.
Carbon	75.00	73.97.
Hydrogen	4.72	4.12
Oxygen	20.28	21.91

The accepted formula for vanillin, to the odor of which that of the plant is likened, indicates carbon, 63.15, hydrogen, 5.34, and oxygen, 31.51 per cent.

It may not be out of place here to say that the melting-point of coumarin, as given by different authors, is the same, as illustrated by the following examples, taken from Husemann and Hilger's "Pflanzenstoffe." According to Zwenger and Bodenbender, it melts at 64° C.; according to Perkin, at 67° to 67.5° C.; according to

Buchner, at 50° C.; while Kossman found it to melt at 40° C.; but in the last case the melting-point was very likely lowered by the substance being contaminated with fat.

LITHIUM CITRATE.

BY LYMAN F. KEBLER.

Research Committee E, Pharmacopœia Revision.

This is the most important lithium salt, excepting the carbonate, now in use. It is used quite extensively and has been the subject of several investigations. But there seems to be considerable difference of opinion as to whether the hydrous¹ or the anhydrous salt is the proper article. The U.S.P. recognizes the anhydrous, while the 1898 Br.P. recognizes the hydrous. If it is the aim of the Pharmacopœias to recognize that article which is of a constant composition, the choice lies with the crystalline product. It has been shown a number² of times that the product containing the full quota of water of crystallization is uniform in composition, while the so-called anhydrous, may contain from 1 to 4 molecules of water of crystallization. It is anything but uniform.

In order to get more information along this line the writer collected samples from various parts of the United States and made some of the crystalline product on both the large and small scale.

The results are collected in the table on next page:

¹ Hydrous, as here used, means the salt with 4 molecules of water of crystallization.

² 1875, J. Umney, "Year-Book of Pharm.," 559.

1883, C. Thompson, *Pharm. Jour. and Trans.*; AM. JOUR. PHARM., 55, 314.

NUMBER.	Physical Appearance.	Microscopical Appearance.	¹ Soluble in Water at 15° C.	Per Cent. of Moisture Lost at 100° C., in 6 hours.	Per Cent. of Moisture Lost at 110° C., in 6 hours.	Per Cent. of Moisture Lost at 115° C., in 8 hours.	Per Cent. of Moisture Lost at 115° C. to 120° C.	Per Cent. of Moisture Lost at 140° C., in 8 hours.	Per Cent. of Lithium Citrate.
1 . .	Crystals.	Crystals.	1 in 2'42	10'00	14'36	16'51	16'51	21'13	98'68
2 . .	Crystal powder.	Crystals.	1 in 2'43	0'00	0'40	8'34	8'34	13'10	98'73
3 . .	Powder.	Crystals and amorphous.	1 in 2'43	0'10	0'50	7'23	10'93	12'00	98'94
4 . .	Powder.	Crystals and amorphous.	1 in 2'47	19'90	20'00	22'13	22'40	24'90	99'05
5 . .	Crystal powder.	Crystals and amorphous.	1 in 2'48	16'93	19'50	21'22	23'20	25'50	98'56
6 . .	Crystal powder.	Crystals.	1 in 2'42	0'20	1'50	5'14	5'70	12'49	98'60
7 . .	Crystal powder.	Crystals and amorphous.	1 in 2'38	0'60	5'00	5'10	5'30	12'36	98'81
8 . .	Crystals.	Crystals.	1 in 2'44	17'50	20'00	22'50	23'40	25'57	98'79

¹ This is the anhydrous chemical.

There seems to be some difference of opinion as to whether or not the article is deliquescent. Before a judgment can be passed, it must, first of all, be decided whether the hydrous or the anhydrous product is meant. The 1898 Br.P. says the hydrous salt is deliquescent. The writer has exposed powdered lithium citrate, containing the full quota (25.5 per cent.) of water of crystallization to an atmosphere saturated with moisture (raining more or less all the time) for three days, and there was not a sign of deliquescence. He has also seen a container of a similar article exposed for months and the only sign of deliquescence was a slight lumpiness, which could hardly be attributed to any such cause.

On exposing the samples, dried to a constant weight at 140° C., to a saturated atmosphere, as above, six deliquesced very rapidly and the other two only slowly. Enough, however, to call them deliquescent in a moist atmosphere. The conclusion would be that the hydrous product is not deliquescent, while the perfectly dry article is more or less deliquescent. It should be noted, however,

that after the samples had taken up a certain amount of moisture, they became brittle and non-deliquescent.

Those which possessed the highest per cent. of water of crystallization appeared to be the most deliquescent, after having been dried as above. That these dried products possessed considerable avidity for water was manifested from the rise of temperature, developed when the dried articles were added to water, or *vice versa*.

Just why the various makes of lithium citrate, dried side by side, behaved so differently, when exposed to the atmosphere is difficult to say. They were all of the same degree of fineness.

The degree of solubility is another factor that depends on the kind of salt considered. The anhydrous salt, according to W. A. Puckner,¹ is soluble in 2.38 parts of water at 15° C. The results obtained in this investigation indicate that lithium citrate is somewhat less soluble, on the average, than this; or one part of lithium citrate requires 2.434 parts of water at 15° C. The solubility of the hydrous article, based on the results obtained for the anhydrous, is one in 1.91 parts of water at 15° C. This is exactly what was obtained by experiment. The solubility as given by the British Pharmacopœia, for this article, is about correct, viz.: that it is entirely soluble in twice its weight of cold water.

The anhydrous lithium citrate is soluble in about one-fourth its weight of boiling water. This is equivalent to the water of crystallization of the hydrous product. On taking the melting-point of the salt containing four molecules of water of crystallization, in a capillary tube, it became pasty at 100° C., and at 115° C. a perfect solution was obtained. The boiling-point of a saturated solution of the anhydrous article varied from 115° C. to 120° C. Neither the hydrous nor the anhydrous salts are soluble, to any appreciable extent, in either alcohol or ether.

The aqueous solutions were either neutral to litmus or slightly acid.

On ignition there is left a blackish residue, consisting of a mixture of carbon, lithium carbonate and the oxides of lithium.

In estimating the amount of water of crystallization some unexpected results were obtained.

After drying some of the products at 115° C. for eight hours, then estimating the amount of pure lithium citrate, it was surprising

¹ 1892, *The American Druggist*, page 65.

to find that the results were considerably below what they should have been theoretically. Several samples were then dried at 140°C . and in every case an additional amount of moisture was lost corresponding to differences indicated by the analytical results. Then the moistures of all the samples were carefully taken, and the results obtained are recorded above. They were all dried in the air-bath at the same time.

The above results were obtained from the same material dried at the above temperatures, from six to eight hours. The amount of water lost at 100°C . corresponded, approximately, to three molecules of water of crystallization, when four molecules were present.

Not all of the water seems to have been lost by drying at from 115°C . to 120°C . for eight hours. This would indicate that a higher temperature than the above, is required to completely dissipate the water. It may be that a lower temperature than 140°C . will suffice to produce an anhydrous article, but the above temperature is safe, and the chemical does not seem to be injured.

A 5 per cent. solution, acidulated with acetic acid, should not be affected by hydrogen sulphide, ammonium oxalate, or sodium cobaltic nitrite; neither should ammonium sulphide produce more than a faint coloration, or silver nitrate or barium chloride more than a faint opalescence, when added to the above solution.

The U.S.P. method for eliminating an excess of other alkalies is the best obtainable for the present for this salt.

The directions given for estimating the amount of pure lithium citrate in this chemical, have not given the writer satisfactory results. For comments on this operation see this JOURNAL, Vol. 71, page 61. Unfortunately, the ammonium sulphate process is not applicable. There is such an abundance of intumescence that the ammonium sulphate does not act well, and the incineration becomes very tedious.

The following method gives good results: Weigh about 0.5 gramme of the anhydrous, powdered salt into a platinum capsule; porcelain will answer; to this add, in drops from a pipette, so as to get as complete a mixture as possible, about 1 c.c. of concentrated sulphuric acid. Place the mixture on a water bath a few minutes, so that the sulphuric acid will thoroughly permeate all of the lithium citrate. Now incinerate. Apply the flame gradually at first, to avoid spirting. If the work has been well done, the lithium citrate has been completely converted into the sulphate.

One gramme of the anhydrous salt yields 0.7861 of a gramme of lithium sulphate, or the amount of lithium sulphate multiplied by 1.272 gives the equivalent of lithium citrate.

The average of the above results is somewhat below the present pharmacopœial requirement. This may be due to a possible loss during incineration, for it was noticed that when a flame was held above the capsule during the first portion of the operation, a crimson coloration was imparted to it. This is also the case with the ammonium sulphate process, and simple ignition of any organic lithium salt. As is well known, a very minute quantity of lithium imparts a crimson color to the flame. The gases evolved in the first portion of the operation apparently carry off enough of the lithium compounds to produce this coloration. Whether the amount evolved is weighable or not has yet to be determined.

35 POPLAR STREET, PHILADELPHIA.

EXAMINATION OF SOME OFFICIAL FLUID ACIDS.

Contribution from the Chemical Laboratory of the Philadelphia College of Pharmacy. No. 181.

The purity and strength of medicine is always a matter of interest to both the physician and pharmacist. For this reason, it has been the custom in the Chemical Laboratory, during several years past, to have students examine samples of official medicines dispensed by pharmacists, in order to ascertain how closely these agree with the pharmacopœial requirements of purity and strength.

The samples referred to in the present contribution were purchased from wholesale and retail druggists in Philadelphia. In each case, the official article was asked for. The results of the examinations serve to indicate the variations in quality to which such simple and inexpensive medicines are liable, while the knowledge of such variations from the official standards emphasizes the necessity of the retail pharmacist testing his purchases and products in order that he may supply the public with medicines of uniform purity and strength.

JOSIAH C. PEACOCK,
Director.

Acidum Aceticum.—Robert T. Berry, P.D., examined twelve samples of acetic acid. All of the samples corresponded to the

pharmacopœial description—"a clear, colorless liquid, having a strong vinegar-like odor, a purely acid taste, and a strongly acid reaction." All of them, however, left some residue upon evaporation. None of the samples contained copper, lead or other poisonous metals. Samples 1, 9 and 12 were free from both hydrochloric and sulphuric acids; samples 3, 8, 10 and 11 contained traces of sulphuric acid; the other samples were contaminated with both of these impurities. Only samples 6 and 8 responded to the test for formic and sulphurous acids. Sample 11 was the only one which exceeded the limit of empyreumatic substances allowed by the Pharmacopœia. The samples contained the following percentages of absolute acetic acid: 36.9, 44.0, 37.2, 44.9, 45.0, 31.5, 44.8, 44.7, 44.8, 40.6, 50.6, and 45.2. The official strength is 36 per cent.

Acidum Hydrobromicum Dilutum.—David K. Bishop, P.D., titrated ten samples of diluted hydrobromic acid according to the directions of the Pharmacopœia. By this means he found the strengths of the samples to range as follows: 10.6, 10.4, 10.9, 12.0, 10.1, 13.9, 14.3, 15.0, 14.1, 12.3 per cent. The Pharmacopœia requires the presence of 10 per cent. of real hydrobromic acid.

Acidum Hydrochloricum Dilutum.—Swain H. Brewton, P.D., estimated the absolute hydrochloric acid contained in ten samples of diluted hydrochloric acid. The following percentage amounts were found: 10.85, 11.00, 10.09, 3.70, 10.20, 10.30, 11.12, 8.68, 9.37 and 11.40. To be official the preparation must contain 10 per cent. of absolute hydrochloric acid.

Acidum Hydrocyanicum Dilutum.—Claude R. Middleton, P.D., considered this subject. The Pharmacopœia requires diluted hydrocyanic acid to contain 2 per cent. of absolute hydrocyanic acid. Pharmacists are directed by the same authority to keep the substance in small, dark amber-colored, cork-stoppered vials, in a cool place. But, notwithstanding this direction, the five different samples of the acid procured were contained in glass-stoppered vials, and only one of these vials was of amber-colored glass. The samples were carefully estimated, using for each estimation five times the quantity specified by the Pharmacopœia, so as to reduce the error of titration. The respective samples showed 1.30, 1.73, 2.80, 1.69 and 1.40 per cent. of absolute hydrocyanic acid. All were colorless and all except No. 5 evaporated completely; it left a trace of residue.

Acidum Hypophosphorosum Dilutum.—Ralph L. Haus, P.D., found the physical properties of the five samples of diluted hypophosphorous acid sold to him to correspond to the description given by the Pharmacopœia. The total acidity of each sample calculated as hypophosphorous acid was first determined according to the official method. By this process the samples showed 16.0, 11.0, 16.1, 10.1 and 14.5 per cent., respectively. They were then titrated with potassium permanganate volumetric solution as further directed by the Pharmacopœia. The corresponding results by this method were 15, 10, 16, 9 and 14 per cent., showing the presence of foreign acids in the samples. The Pharmacopœia requires *about* 10 per cent. of absolute hypophosphorous acid; the allowable variation implied by the word *about* being 2 per cent. of the 10 per cent. of hypophosphorous acid, either way.

Acidum Lacticum.—William R. Bready, Jr., P.D., examined four samples of lactic acid of different makes. The first sample contained chlorides, sugars and glycerin. It showed 73.9 per cent. of absolute lactic acid. The second sample showed traces of chlorides, sulphates and sugars; it assayed 74.8 per cent. of absolute lactic acid. Samples 3 and 4 contained sugars only. Both of these were found to represent 75 per cent. of lactic acid. All of the samples were free from sarcolactic acid, iron and lead.

Acidum Phosphoricum Dilutum.—Theodore S. Schlauch, P.D., investigated twelve samples of this substance. All the samples except No. 1 were colorless and odorless; it had a milky white color and a disagreeable odor. Samples 1, 8 and 9 contained sulphates. Sample 1 alone showed chlorides, phosphates and heavy metals. All were free from nitric and phosphorous acids. The percentages of phosphoric acid present were: 10.5, 11.0, 10.0, 16.5, 10.9, 5.0, 10.0, 19.5, 24.0, 22.5, 8.5 and 7.3.

Acidum Sulphuricum.—Ernest A. Troth, P.D., procured samples of the sulphuric acid put upon the market by seven different manufacturers, and sold as the official article. Samples 1, 3 and 7 were entirely free from impurities. Samples 2 and 6 contained a small amount of nitrous acid and a large amount of hydrochloric acid. Sample 4 held an appreciable amount of lead sulphate in solution. Sample 5 showed a considerable amount of hydrochloric acid. All were free from arsenic, copper and iron. The amounts of absolute sulphuric acid calculated from the total acidities of the several samples were: 79.39, 94.03, 96.68, 91.99, 97.43, 97.38 and 98.06 per

cent. It will be seen from these figures that but two of the samples contained less than the 92.5 per cent. of absolute sulphuric acid required by the Pharmacopœia.

Acidum Sulphuricum Aromaticum.—Charles W. Beyerle, P.D., made an examination of twelve samples of this preparation for the purpose of estimating the amount of official (92.5 per cent.) sulphuric acid present in them. The results indicated 10.26, 15.33, 12.20, 11.34, 10.26, 13.39, 12.42, 16.41, 11.34, 11.34, 10.80 and 9.72 per cent. The Pharmacopœia requires the preparation to contain *about* 20 per cent. of the official sulphuric acid, the variation thus allowed being between 19.6 and 20.4 per cent.

Acidum Sulphurosus.—John E. Coleman, P.D., examined eight samples of sulphurous acid. All the samples were clear and colorless. Sample 8 was odorless; the odor of sample 3 was very faint. All showed sulphuric acid, and failed to evaporate without leaving a residue. The official method of estimating the sulphur dioxide was applied to the samples with the following results: 3.4, 3.45, 0.007, 2.49, 4.3, 1.5, 0.175 and 0.002 per cent. These results show a great variation from the official requirement of 6.4 per cent. of sulphur dioxide.

A COMMON ERROR IN RECORDED RESULTS OF PROXIMATE PLANT ANALYSIS.

BY LYMAN F. KEBLER.

Under the above title the writer made a few remarks which appeared in the January number of this JOURNAL. From a certain portion, it might appear that the schemes of analysis were being criticised, and the editor justly appended a foot-note, in this connection. The impression thus conveyed is, however, incorrect. It was clearly stated at the outset, that the remarks were in reference "to an error frequently made in recording the results of proximate plant analysis." The last sentence of the first paragraph imparts the wrong idea. Line *seven*, from the top of this paragraph, should read, "they are frequently recorded again," instead of, "they must necessarily be recorded." The error referred to is not due to the analytical schemes, but to inadvertent recapitulations. Any one can ascertain this for himself, by consulting the literature of proximate plant analysis during the past fifteen years. It will be found that the ash is doubly recorded, either in part or as a whole, again and again.

RECENT LITERATURE RELATING TO PHARMACY.

DIGITALIS LEAVES.

Pharmaceutische Rundschau (1898, 603) prints an extract from the "Bericht" of the firm of Cæsar and Loretz, concerning digitalis. It states that the crop of 1898 up to August 1st, contained a higher percentage of digitoxin than that of the same period of 1897; while the August harvest was poorer than that of 1897. Cultivated plants—even those originally wild—yielded less digitoxin than the wild, and the drug picked in August was weaker than that collected in June. The drug from non-flowering plants contains more digitoxin than that collected at the same time from plants in bloom.

The digitoxin strength is lessened by exposure of the powder to air and sunlight.

Both digitalis root and seed contain digitoxin—the latter 0.162 per cent.

Pure digitoxin is insoluble in water, yet, from infusion of digitalis, considerable quantities of the principle is obtainable. In explanation, it is said that the drug contains other glucosides, forming digitoxin on digestion.

H. V. ARNY.

QUANTITATIVE ESTIMATION OF CAFFEINE AND THEOBROMINE.

W. Kunz (*Schw. Wochensch. für Chem. und Pharm.*, 1898, 301) submits a method of assay of the two alkaloids, which he states gives good results. The outlines of the process are: extraction of drug with boiling water; removal of gum, etc., from infusion by freshly precipitated lead hydrate; filtration; removal of lead from filtrate by carbonic oxide gas; evaporation of filtrate to dryness with sand; and extraction of residue with ether. The ethereal solution, on evaporation, leaves a mixture of pure theobromine and caffeine. These are separated by precipitation and weighing of theobromine as silver salt.

H. V. A.

ESTIMATION OF NICOTINE IN TOBACCO.

This assay is conducted by R. Hefelmann (*Ph. Centralh.*, 1898, 523) by treating 20 grammes of the powder with 20 c.c. of 6 per cent. solution of potassa, shaking with 200 c.c. ether and withdrawing in pipette 50 c.c. of the ethereal layer. This is evaporated in a current of air and the alkaloid extracted from the fatty residue

with 10 c.c. alcohol, the solution diluted with 50 c.c. water and titrated with $\frac{1}{10}$ normal sulphuric acid; hæmatoxylin or cochineal being used as indicator.

For more exact assay, the residue from 50 c.c. of the ethereal solution is treated with 10 c.c. water and a few drops solution of soda, and distilled with steam until 400 c.c. distillate is obtained. This is titrated as above.

In German tobacco, cigars and cigarettes advertised as free from nicotine, the author found that alkaloid in quantities ranging from 0.35 per cent. to 1.53 per cent.

H. V. A.

CHILEAN SOLANUM SPECIES.

A popular remedy of Chile is "Natri," being the leaves and shoots of *Solanum crispum*, *Ruiz et Pavon*; *S. gayanum*, *Remy*, and *S. tomatello*, *Remy*. It is employed as infusion in measles and scarlet fever. Ramdohr and Neger (*Ph. Centralh.*, 1898, 521) extracted from it 0.1 per cent. solanin.

H. V. A.

PHARMACOLOGICAL NOTES.

THYROID EXTRACT.

Samuel Bell, M.D. (*Journal American Medical Association*, November 19, 1898), in an interesting paper on "Thyroid Extract," states that, according to some very reliable authorities, two main theories have been advanced concerning the action of the thyroid gland. "The first is the auto-infection theory—the gland having for its function the destruction of the natural toxins; without the latter we have the condition known as myxedema. The second is the internal-secretion theory—the thyroid being considered as a secreting gland. The secretion is taken up by the lymph vessels, and is necessary for the proper metabolism of the body, especially for nervous and connective tissue. According to either of these theories, the administration of the desiccated gland supplies the lacking secretion, which may be some chemic substance that is necessary to health or even life. Ewald, in a pithy sentence, states that the gland acts as an antitoxin against certain elements that appear as by-products of tissue change. The exact constituents of this substance have never been definitely made known. An organic

iodin compound from the sheep thyroid has been extracted, called thyro-iodin, and in the present state of our knowledge the weight of authority is in favor of this being the effective chemic agent in thyroid therapy."

J. L. D. M.

POISONING BY CANNABIS INDICA—RECOVERY.

Saxby (*British Medical Journal*, October 15, 1898) reports a case of poisoning from two teaspoonfuls of tincture of *Cannabis indica*. The patient was perfectly well at 9.15 o'clock. At 10 o'clock his pulse was weak and irregular, and the heart-sounds faint. The whole body was bathed in perspiration and cold, the limbs flaccid and the plantar reflex absent. The pupils were widely dilated, contracting slightly when a candle was placed near the eye. The patient could not be roused, and the conjunctival reflex was absent. The injection hypodermically of gr. $\frac{1}{50}$ of strychnine sulphate was followed by prompt response. The patient opened his eyes, understood what was said to him, but was unable, at first, to speak. He was given gr. $\frac{1}{10}$ of apomorphine hypodermically, after which he vomited promptly and profusely, and he then recovered rapidly.—*Phila. Med. Jour.*, p. 946.

J. L. D. M.

EDITORIAL.

IMMUNITY OF CERTAIN ANIMALS TO POISONS.

In an editorial in a recent issue of this JOURNAL, attention was directed to the difficulty of framing a definition as to what constitutes a poison. The expression, "What is one man's meat is another man's poison," is applicable not only to man, but the whole animal as well as plant kingdom. Arsenic, while commonly believed not to be injurious to plants, is shown by the investigations of Stoklasa to be highly poisonous to some plants, in relatively minute quantities. Many experiments have been made to determine the toxicity of various substances on plants, and the results obtained would seem to indicate (as suggested by Frank) that there is a difference in certain plants to absorb toxic substances; this having been particularly verified in analyses of peas, violets, silenes, etc., growing in soil containing zinc.

In the animal kingdom it is particularly noteworthy that some animals enjoy an unusual immunity from the action of certain poisonous plants. Goats can eat the leaves and other parts of stramonium and are apparently not affected. Horses, goats and sheep can eat conium leaves with impunity. Birds may likewise eat the berries of belladonna. In an article in the *National Druggist* (1897, p. 103) the writer shows that *Cytisus repens* (Laburnum) can be eaten with impunity by ruminants of all kinds, but is deadly to horses. The hedgehog is not affected by either cantharides or the venom of vipers. The pig is likewise

well known to be immune to the poison of rattlesnake. Hyoscyamus, while it is deadly to man, monkeys, deer, rodents and birds, is harmless to horses, goats, sheep and domestic horned animals. Morphine, is harmless to goats, sheep, antelopes and other animals. These animals can tolerate as much as 2 to $2\frac{1}{4}$ grains of morphine to the pound weight of individual.

In a recent issue of the *Scientific American* is contained a letter from *Nature* in which the correspondent observed a number of thrushes feeding on the berries of *Pyrus aucuparia* and that the ground was covered with ejected seeds and skins of the fruit. He also noted that while the pulp had disappeared, the skins were as bright as ever, showing that they could not have passed through the alimentary canal. The excessive drought, by decreasing the supply of their ordinary food, was evidently the cause of the birds taking the berries at such an early period in September. The same correspondent observed a similar case in the fruit of the yew. Another writer observed thrushes stupefied from eating the berries of *Daphne Mezereum*, but in this case there is little question but that the seeds were ejected. Another writer found that pheasants were killed by eating the leaves of the yew tree, and similar instances are recorded. Everyone is familiar with the manner in which owls disgorge the fur and bones of mice and the skulls of small birds—a habit which is shared by all the raptorial birds. The habit of ejecting the indigestible and poisonous parts of foods by birds is an interesting subject for observation and experiment.

A few years ago a short article appeared in the *Bulletin of Pharmacy* (1891, p. 116), by Frank Nabers, on "A New Use for Strychnine." The writer states that "in certain districts of the country, especially the mountainous parts of the Southern States, farmers find it almost impossible to successfully raise poultry, on account of the depredations of hawks. When the chickens have reached that very toothsome age of 'spring,' the hawks, in spite of the vigilance of the farmers, succeed in carrying them off, to such an alarming extent, that the poor farmers, in their desperation, are willing to resort to any device which will rid them of the bold marauders. The plan which they have adopted is as follows, and a unique one it certainly is: A quantity of 'nux vomiky buttons' are procured and powdered about as fine as ordinary corn meal. A very generous supply of this unpalatable meal is added to the chickens' food, and as the chicken is a bird which digests its food entirely by mechanical means, gravel, sand, etc., it is not affected at all by the strychnine, which is practically insoluble in water (solubility being about 1-36,000) and does not act locally, but only by absorption, thus large quantities can be given the chickens with impunity, and still not interfere with their use as an article of food for man, as the strychnine remains undissolved in the entrails. But when the unsuspecting hawk takes one of these doctored fowls to his lofty home, he is seized with an attack of indigestion, or rather digestion of strychnine, after eating his stolen meal, from which he never recovers. For the hawk is a carnivorous bird, hence its digestion is a chemical one instead of mechanical, and as the entrails are to him the daintiest portion, he gets into his stomach the greater part of the undissolved drug, which is acted upon by digestive fluids present in the stomach, forming soluble compounds, which, being absorbed, result fatally."

This article interested the present Editor of the AMERICAN JOURNAL OF PHARMACY to the extent of performing some experiments a few years ago. A small chicken, weighing about three-quarters of a pound, was isolated and

fed on corn-meal containing various percentages of powdered nux vomica for several days.

On July 17th, at 8 A.M., it was given meal containing 0.18 grain of nux vomica. At 1.20 P.M. of the same day, it was again given meal containing 0.18 grain of nux vomica.

On July 18th, at 8 A.M., the chicken was given a mixture of cornmeal containing 0.36 grain of pure nux vomica. At 11 A.M., 0.72 grain was given.

On July 19th, at 8 A.M., 2 grains of nux vomica were given it with its meal. All of the meal containing the nux vomica was eaten, and it was considered that the experiments afforded some evidence that nux vomica was not toxic to the chicken. The chicken was allowed its freedom and watched for some time, and gave every evidence of being rather improved by the treatment.

This opens up a rather interesting practical problem. Cannot some of our drugs, after the extraction of medicinal constituents, be utilized as food for poultry, etc., just as linseed- and cotton-seed meals are fed to cattle? All of our roots and rhizomes, fruits and seeds are rich in food materials which can, no doubt, be utilized after the extraction of their active principles for medicinal preparations, in feeding some of the lower domestic animals. This is well worth the consideration of large manufacturing firms where thousands of tons of exhausted drugs are doubtless daily thrown away.

REVIEWS AND BIBLIOGRAPHICAL NOTICES.

OUTLINES OF INDUSTRIAL CHEMISTRY, A TEXT-BOOK FOR STUDENTS. By Frank Hall Thorp, Ph.D., Instructor in Industrial Chemistry in the Massachusetts Institute of Technology. New York: The Macmillan Co. London: Macmillan & Co., Ltd. 1898. Price, \$3.50, net.

The author states that the object of this book is to furnish an elementary course in industrial chemistry, which may serve as the ground-work for a more extended course of lectures, if desired. As the whole range of chemical industries, both inorganic and organic, is covered in the compass of 528 pages, it is necessarily an outline only, and yet it can serve, satisfactorily, the purpose indicated for it by the author.

The first twenty pages are devoted to an account of the general operations necessary in most chemical industries, and we note an excellent discussion of the methods of evaporation, calling attention to the economy of fuel involved in multiple-effect systems, the Yaryan evaporator being given as illustration; under distillation, the theory of fractional condensation is clearly stated and an account given of column stills; under filtration, a description of filter presses with illustrations and the use of centrifugal machines; under refrigeration, the theory of artificial refrigerating machines, in which a volatile liquid is alternately vaporized and recondensed, is given with an illustration of the condensing and expansion vessels and the method of their connection.

Fuels both solid and gaseous are briefly but well covered.

We note with satisfaction that many new processes of importance are mentioned, processes which have not as yet been taken up in text-books generally. Thus Squibb's process for the manufacture of acetone by passing the vapors of acetic acid through heated pumice mixed with barium carbonate is

given a place. The Readman process, for the production of phosphorus by the electric furnace, which has already displaced the old distillation process in practice, is also mentioned, although the description is rather inadequate.

The section on textile industries is very satisfactorily developed, as well as those on explosives and paper-making. That on varnishes is very incomplete, and the part played by the several classes of driers is only slightly alluded to in a different section under linseed oil.

The chlorine industry is very satisfactorily treated, and the newer electrolytic processes for chlorine, hypochlorite and chlorate are also given proper attention.

A few blemishes show, and in mentioning some of them no sweeping condemnation is intended. Some of them detract appreciably, however, from the excellence of the sections in which they occur.

Thus the author states that one of the chief uses of crude sulphur is as a germicide in combating *Phylloxera*, "a disease of the grape," and that this disposes of nearly one-quarter of the yearly production. The germicide used against the insect called *Phylloxera vastatrix* is either carbon disulphide or the xanthogenate of potash, made by the reaction of this latter with alcoholic potash.

The formula of bleaching powder



the author says was assigned by Lunge. It was first suggested many years ago by the English chemist, Odling.

Under recovered sulphur, no mention is made of Chance sulphur, which is the chief form at present produced in England.

Sodium bisulphite is given prominence as "Antichlor" in removing excess of chlorine from chlorine-bleached goods, on page 44, to the exclusion of the thiosulphate, yet in the section on paper bleaching, on page 509, the thiosulphate is referred to as the sole practical antichlor, as it is in fact.

Crude petroleum is described on page 290 as a "thick syrupy liquid." This would hardly apply to the bulk of the crude oils met with in the refineries, which is a thin greenish liquid of from 42° to 51° B.

However, these are minor matters as compared with the general excellence of the work, which, as an outline picture of our main chemical industries, is a very satisfactory piece of work.

The book has a number of helpful illustrations and lists of reference works are appended to each section.

S. P. S.

PHILADELPHIA ASSOCIATION OF RETAIL DRUGGISTS.

As a result of the organization of the National Association of Retail Druggists at St. Louis, October 17, 1898, the Philadelphia Association of Retail Druggists was organized December 2, 1898, and the following officers elected:

President, Wm. McIntyre; First Vice-President, W. L. Cliffe; Second Vice-President, A. Hoch; Treasurer, Dr. Edwin R. Smiley; Secretary, W. A. Rumsey.

Executive Committee.—James C. Perry, Chairman; E. R. Gatchel, D. H. Ross, H. C. Blair, Jr., E. J. Finnerty, Jr.

At a later meeting the Constitution and By-Laws were adopted.

The question is asked by many, what does all this amount to, and what advantage will this be to me individually? A body of men working together for some general good can do more than one individual, and that is the reason almost every trade or profession have their organizations. Whatever advantage is gained by the National Association will be a benefit to each one of us, because the Wholesale Druggists' Association, and the Proprietors' Association, will hesitate to do anything which would be contrary to the wishes of the National Association, and backing the National Association there will be nearly 30,000 retail druggists throughout the United States, and it is through these druggists, that the wholesale druggist makes his money and the patent medicine manufacturer sells his remedies.

By organization a sociable feeling is created. We become more friendly one with the other, learn new ideas and improved methods of doing business, and we can unite together to promote any plan which will benefit us.

It is proposed to establish for the benefit of the members of the Association :

A classified record of clerks. A credit bureau. To create a proper feeling between the physician and pharmacist, and to induce the physician to prescribe more generally the "U.S.P." and "N.F." preparations.

Our meetings are held the first Friday in each month at 3 P.M. sharp, in the museum of the Philadelphia College of Pharmacy, the use of this room having been granted to the Association by the Board of Trustees of the Philadelphia College of Pharmacy. At our June meeting delegates to the National Convention will be elected. The membership dues are one dollar a year, and the hearty co-operation is asked of all retail druggists in Philadelphia, that our Association may be a success, that we may become a power in the National Association and an honor to the profession which we represent.

W. A. RUMSEY,
Secretary, P. A. R. D.

MINUTES OF THE PHARMACEUTICAL MEETING.

PHILADELPHIA, February 21, 1899.

The regular monthly Pharmaceutical Meeting was held in the Museum of the College, with Wallace Procter in the chair.

The minutes of the previous meeting were allowed to stand as published.

As a result of the recent belladonna plaster controversy, Prof. F. X. Moerk furnished a paper on "The Assay of Belladonna Leaves, and Some of Its Preparations," which will no doubt prove to be a most important contribution to the literature of the subject (see page 105).

A paper, incorporating improved formulæ for the "Syrups of Acacia and Althæa," was presented by F. W. Haussmann, and will be published in full in a subsequent issue of this journal.

Speaking on the preservation of syrups, Wallace Procter said that he had been able to keep Jackson's Pectoral Syrup almost indefinitely by the addition of small quantities of oil of sassafras. Professor Ryan stated that almost any

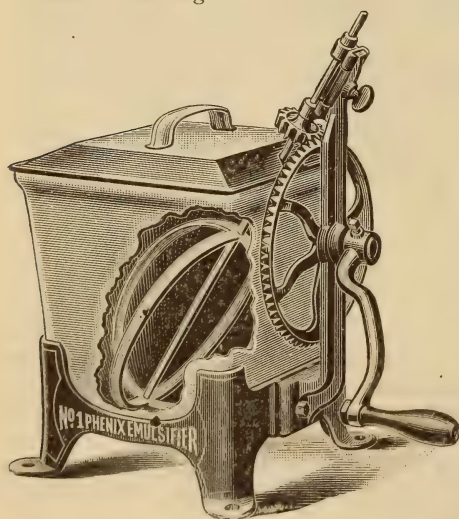
syrup which was sterilized and stoppered and kept in a cool place, would keep indefinitely, this being, as he thought, one of the features of Mr. Haussmann's paper. Mr. Haussmann showed that independent of these facts the preparations made by his formula possessed greater stability than those made by the Pharmacopœial and other formulæ. Professor Ryan also alluded to the usefulness of chloroform as a preservative for the syrup and mucilage of acacia, which fact is quite generally known. Dr. Wendell Reber believed that when antiseptics were employed they should be innocuous and tasteless, as otherwise confusion was likely to arise in the mind of the patient. He also alluded to the possible use of formalin as a preservative in pharmaceutical preparations. Mr. Procter stated that he found formalin useful in keeping milk of asafœtida.

Mr. Frederick L. Lewton exhibited a collection of cardamoms, and in connection therewith made some interesting remarks, which will be referred to in a later issue of this JOURNAL.

Professor Ryan alluded to the collection in the College of seven specimens of cardamoms sent by Mr. Daniel Hanbury to the late Professor Procter. These were interesting, as they were labelled in the handwriting of Mr. Hanbury.

Dr. Wendell Reber read a paper on the "Chemistry of the Mydriatic Alkaloids." This was based on the more recent researches of Pinner, which aimed to clear up the ambiguity on the nomenclature of this class of substances. Those participating in the discussion of this paper were Mr. Kebler, Dr. Reber and the chairman.

Professor Remington exhibited one of the "Phoenix Emulsifiers," which had



been presented to him by Messrs. Whitall, Tatum & Co. The apparatus is intended for the use of the retail pharmacist in the manufacture of emulsions of cod liver oil, and may be used according to either the Continental or English method. A cut of the apparatus is here presented, which conveys more than a description. A copying machine for either writing or typewriting, and known as the "Neostyle," was exhibited and recommended as useful for printing by pharmacists. Attention was called by Professor Ryan to the "Anchor Safety Stopper" poison bottle, which is the invention of Mr. Albert T. Plummer, of New York

City. This consists of a glass rod suspended in the bottle by means of an asbestos cord, which is attached to the cork. This device serves as a warning, if, by mistake, a bottle containing poison is taken, in two ways, viz.: The sudden arrest of the cork and the rattling of the glass against the sides of the bottle. A convenient medicine dropper, invented by Dr. W. R. Sine, was also exhibited.

On motion, the meeting adjourned.

THOS. S. WIEGAND, *Registrar.*

THE AMERICAN JOURNAL OF PHARMACY

APRIL, 1899.

✓
SYRUPUS ALTHÆÆ.

By F. W. HAUSSMANN,

Research Committee E, Pharmacopœia Revision.



The desirability of a formula for this syrup, which would furnish a preparation possessing greater stability, has been expressed by American as well as Continental pharmacists.

To the former the present official cold process is extremely unsatisfactory, and almost every step in the course of preparation has been subjected to criticism.

Prominent objections, as pointed out by different writers, are the short time directed for macerating the root, the neglect of making allowance for the amount of menstruum absorbed by the althæa and consequent failure of dissolving all the sugar in the strained liquid.

By far the greatest difficulty which confronts the pharmacist, lies however, in the instability of the syrup.

The Pharmacopœia of 1880 directs recent preparation which, if the time necessary for completion is considered, is impracticable.

The present Pharmacopœia omits directions for recent preparation, but recommends the syrup to be kept in filled bottles in a cool place.

To secure greater stability the addition of 10 per cent. by volume of glycerin is ordered.

It is, nevertheless a fact, that in warm weather the syrup will rapidly decompose, and in not a few instances fermentation takes place before the syrup is even completed.

Stability of a pharmaceutical preparation in the hands of the con-

sumer is equal in importance to its keeping qualities in the shop bottle of the dispenser.

On standing a short time the cloudy syrup will be found to contain a mucilaginous deposit, which appears to be the direct medium of inducing fermentation.

To insure greater stability of the syrup, the whole or a part of the mucilage must therefore be removed.

This would, however, involve the question if the mucilage is of such signal importance, that its presence is absolutely necessary to the therapeutical value of the syrup.

Experiments conducted by the writer and extending over two years, show that a stable preparation can only be produced by removal of the mucilage.

Addition of glycerin is practically valueless as long as cold preparation with presence of the mucilage is directed.

The German Pharmacopœia, like the U.S.P., directs cold infusion of the althæa in a weak alcoholic menstruum.

The addition of alcohol is necessary to lessen the liability of fermentation in the infusion in warm weather.

The time of maceration should also be increased from one to three hours.

Up to solution of the sugar in the infusion, the working formulas of the United States and German Pharmacopœias coincide.

The former at this point directs the sugar to be dissolved by agitation without heat, while the latter directs the syrup to be heated to the boiling-point with filtration of the syrup, thus removing a part of the mucilaginous principles.

That this formula is not satisfactory to German pharmacists is demonstrated by the suggestions for improvement occasionally published. Most authors recommend clarification of the mucilage, preparation of the syrup by means of heat, and removal of the scum from the boiling syrup.

Prominent among these modifications is a process recommended by Gesche, published in the Proceedings of the A. Ph. A. of 1895.

This consists in preparing the infusion by the cold process, and evaporating the same to definite volume.

Alcohol is now added to precipitate the mucilage, the mixture filtered, made up to a certain volume with water, and the sugar dissolved by heat.

For practical purposes this method is too tedious, and may be modified without resorting to evaporation.

Dieterich clarifies the infusion by means of paper pulp, dissolves the sugar in the liquid by means of heat, and removes the scum from the boiling syrup.

This formula, as published has the disadvantage of not directing a definite weight or volume of the finished syrup.

After a number of trials the following formula was found to furnish a syrup which will not ferment, and possesses the flavor of the althæa.

Specimens, prepared over a year ago, and exposed to all temperature conditions, have retained their original appearance, flavor and consistence.

SYRUPUS ALTHÆÆ.

Althæa, cut into small pieces	50 grammes.
Alcohol	30 c.c.
Sugar	750 grammes.
Water, a sufficient quantity to make	1,000 c.c.

Wash the althæa with cold water, then macerate it with 400 c.c. of water, previously mixed with the alcohol during three hours, stirring frequently and strain without expression.

Heat the infusion to boiling, add 10 grammes of purified talcum; and filter while hot, passing a sufficient quantity of boiling water through the filter to measure 400 c.c.

Add the sugar to the filtrate, heat to boiling, remove the scum and strain. When cold add a sufficient quantity of water to make the syrup measure 1,000 c.c.

Keep the syrup in completely filled bottles, in a cool place.

Of the several methods experimented with, none furnished as satisfactory a preparation as the one above.

Filtration of the hot infusion without talcum yields a cloudy filtrate, and consequently an inferior syrup, liable to ferment.

Precipitated calcium phosphate, employed in place of talcum, is also unsatisfactory, as larger quantities are required, and a somewhat cloudy filtrate results.

Should it be found necessary for the Pharmacopœia to retain the present formula, the syrup, prepared by the above process, will be found a decidedly more satisfactory preparation for counter sale.

SYRUPUS ACACIÆ.

By F. W. HAUSSMANN,

Research Committee E., Pharmacopœia Revision.

This syrup possesses the disadvantage common to all preparations combining saccharine with mucilaginous principles, of turning sour on standing.

Many pharmacists, therefore, prefer to prepare it extemporaneously, and a formula, which can be manipulated so as to furnish the syrup in reasonably short time is desirable.

Some Continental pharmacopœias have dropped syrup of acacia altogether, leaving it to the judgment of the dispenser to select the method of preparation when ordered.

To American pharmacists the present official process is unsatisfactory.

Besides the time required for the preparation of the mucilage, it furnishes the anomaly of preparing an unstable preparation from another equally liable to decomposition.

Pharmacists who are compelled to keep the syrup on hand, prefer the formula of the Pharmacopœia of 1870, which consists in dissolving the sugar in a previously prepared mucilage by means of heat.

Others resort to the shortest of all methods, that of rubbing the powdered gum with syrup.

Due to the avoidance of heat, the present official syrup possesses the advantage of being transparent.

No formula for rapid preparation can, however, be based upon the official process, as preparation of the mucilage requires too much time for practical purposes. Syrup of acacia cannot be expected to keep indefinitely.

A formula is therefore required which does not lay claim to stability as much as ready manipulation.

The writer made extensive experiments with powdered acacia, with the object of elaborating, if possible, an easily manipulated formula. Objections to the use of powdered gum are the impossibility of obtaining a clear preparation and the development of a disagreeable musty odor on standing.

The latter was noticed in every syrup prepared from powdered gum, and its use was therefore abandoned.

Granulated gum was substituted, with better results.

The point to be observed is to procure an article of good quality, as the color of the finished syrup is influenced thereby. The following formula can be quickly manipulated and furnishes a syrup equal to that of the 1870 Pharmacopœia. When first prepared, it is somewhat cloudy, soon becoming clear, but does not possess the brilliant transparency of the official syrup.

SYRUPUS ACACIÆ.

Acacia, granulated	8.5 grammes.
Sugar	20 "
Distilled water	25 c.c.
Syrup, a sufficient quantity to make	100 c.c.

Mix the sugar with the acacia and add to the distilled water, previously warmed in a capsule.

Stir until dissolved, continuing a gentle heat. Finally add a sufficient quantity of syrup to make the syrup measure 100 c.c.

THE ESTIMATION OF NITRATES AND AMMONIA IN WATER.

BY FRANK X. MOERK.

Read at the Pharmaceutical Meeting of the Philadelphia College of Pharmacy,
 March 21, 1899.

The quantities of chemicals which have to be determined in water analyses are, as a rule, so minute, that the employment of the usual methods of quantitative analysis means the evaporation of large quantities of the samples to obtain suitable quantities of residue, hence, it is not surprising that within recent years delicate colorimetric tests have largely been made use of, particularly in the estimations of the heavier metals and of the nitrogen-containing compounds like the nitrites, nitrates and the free and albuminoid ammonia.

ESTIMATION OF NITROGEN AS NITRATES.

The method generally used, depends upon the formation of aromatic nitro-derivatives, which have intense coloring power, especially in alkaline solutions; the manipulation used by the writer for some years is as follows: 10 c.c. of the sample are evaporated to dryness in a small porcelain capsule on a water-bath; the residue is thoroughly mixed with 1 c.c. phenol sulphonic acid (made by

adding 37 grammes sulphuric acid to a mixture of 6 grammes pure phenol and 3 grammes distilled water) and heated on the water-bath for five minutes; the liquid is then diluted with 5 c.c. water, an excess of water of ammonia added, drop by drop (about 5 c.c.) and the alkaline solution finally suitably diluted for comparison with a standard solution. This standard solution I have always made from a $\frac{N}{100}$ solution of potassium nitrate (1.010 grammes of the fused salt per litre); 1 c.c. of this solution is evaporated to dryness and the residue treated as above, finally diluting to 100 c.c. (each cubic centimetre of this solution represents 0.000014 gramme nitrogen as nitrates). It will very often be found necessary to dilute a portion of this standard solution, so as to match the color of the solution obtained from the sample under examination.

The phenol-sulphonic acid and the standard solution keep very well if protected from light; samples at least seven years old have been examined recently and were found practically unchanged; the phenol-sulphonic acid has deposited a considerable quantity of a white precipitate, but by agitation can be incorporated with the fluid portion and measured without difficulty.

The only objection to this method of estimating nitrates is the difficulty experienced at times in matching the color, and for a long time no modification could be devised which satisfactorily enabled the color comparison.

Several years ago, while working with salicylic acid, the idea suggested itself to use a saturated solution of salicylic acid in sulphuric acid instead of the phenol-sulphonic acid; various samples of water examined with these two reagents indicated the superiority of the salicylic acid reagent because of a deeper colored solution and the decreased number of cases in which difficulty was experienced in the matching. Several months ago, however, a sample of water was examined, which with phenol-sulphonic acid, practically showed no nitrates, but giving with the salicylic acid reagent an intense coloration which moreover was very difficult to match. An examination disclosed the presence of manganese and iron salts in the water and the fact that the difficulty was caused by the manganese.

This experience led me to abandon the salicylic acid solution as a test for nitrates and turned my attention again to the phenol-sul-

phuric acid, with the hope of discovering some means for preventing off-colors, or at least correcting these when produced. The reagents were repeatedly tested, but it was impossible to attribute the discoloration to them; among the usual water constituents organic matters were most likely to cause the difficulty, and the attempt was made to purify the water by precipitation with alum before testing for nitrates, but this did not give the expected results.

The following process, however, has been successful as far as it has been tried, and depends upon the volatilization of the nitric acid when the water residue, in a duplicate test, is heated for some minutes with sulphuric acid on a water-bath, while the organic matter is acted upon by the sulphuric acid to produce the substances causing the off-color; in the test proper the nitric acid reacts to form a nitro-derivative, while the organic matter is acted upon as in the duplicate test; two solutions are therefore obtained, one representing only the color due to the organic matter, whilst the other contains additionally the color due to the nitro-derivative; by suitably diluting these solutions and adding to the former sufficient of the standard nitro-solution until the two solutions are matched, the quantity of nitrates can be determined.

The manipulation is as follows: Two portions of the sample of 10 c.c. each are evaporated to dryness in small porcelain capsules on the water-bath (mark the tests I and II); to I add 1 c.c. strong sulphuric acid; to II add 1 c.c. phenol-sulphonic acid; mix thoroughly with the water-residue and heat on the water-bath for five to ten minutes; then add to I 1 c.c. phenol-sulphonic acid, and to II 1 c.c. strong sulphuric acid; mix thoroughly and heat on the water-bath for five minutes; add to each 5 c.c. distilled water, then 10 c.c. water of ammonia (drop by drop), and, lastly, dilute with water to the same volume (the volume must be such that both of the resulting solutions will be much lighter in color than the standard solution, made as previously described; transfer the entire solutions or aliquot portions of each solution to cylinders or test tubes of equal inner diameter (to obtain equal columns of the liquids from the same quantities) and add to the lighter colored solution (I) measured quantities of the standard solution, to (II) add the same quantities of distilled water until the contents of the cylinders or test tubes match each other in color. Note the quantity of stand-

ard solution added and calculate to entire quantity of solution if an aliquot portion was taken; the number of cubic centimetres of standard solution (required for the 10 c.c. of water started with) $\times 0.14$ will give the parts of nitrogen as nitrates per million parts of water.

AMMONIA DETERMINATIONS.

The importance attached particularly to the presence of albuminoid ammonia, exceedingly small quantities of which suffice to condemn a sample of water, and the difficulty of getting the reagents perfectly free from ammonia makes this the most difficult determination in a water analysis. For some years past the writer has carried out these determinations in a manner which insures the greatest possible accuracy with the least amount of extra manipulation.

The *alkaline potassium permanganate solution* is made by simply dissolving the chemicals in distilled water; it is useless to attempt freeing this solution from ammonia as it cannot be kept so.

In making an analysis, the retort and condenser are rinsed with water, and the retort charged with 30 c.c. of the alkaline permanganate solution, and 200 c.c. clear river or distilled water; to avoid dangerous bumping of the boiling liquid some copper turnings are placed in the retort. The distillate is collected in portions of 10 c.c., and these set aside in regular order, and distillation continued until about 60 c.c. are left in the retort. (The operation so far is for the purpose of freeing apparatus and reagents from ammonia, and enables one in most cases to secure sufficient ammonia-free water to make up the solutions for comparisons. The first six portions of the distillate will, as a rule, contain all of the ammonia; to each of these is added 0.4 c.c. Nessler's reagent; should the last one still indicate the presence of ammonia, more of the distillates in their regular order will have to be tested). 100 c.c. of the water to be tested are now added through the tubulure, and 100 c.c. distillate collected in portions of 10 c.c. and set aside in regular order; in nesslerizing these it must be remembered that if a precipitate is produced it will be impossible to make a colorimetric comparison; it is therefore a good plan to first nesslerize the fourth portion, then the third and second. Should any of these yield a very deep color it will enable one to dilute the first distillate with one or more of

the later distillates, thus avoiding a possible precipitate, and saving the analysis. Total ammonia may be determined in several successive samples of water if the quantity of alkaline permanganate is increased (10 c.c. additional for every sample of water); if 500 c.c. of any sample (as is generally recommended) are to be used for a single determination a corresponding quantity of permanganate must be used.

After determining the *total ammonia*, the retort is rinsed with several portions of water and again charged with 100 c.c. of the sample, to determine the *free ammonia*; instead of adding a solution of sodium carbonate, I have always fused a little of the dried salt on platinum foil, and put the foil, with the fused salt, into the retort. The distillate is collected in four or five portions of 10 c.c. each and nesslerized as previously stated. The difference between the two determinations gives the *albuminoid ammonia*.

In matching the colors produced in the distillates with the aid of a dilute ammonium chloride solution, it was noticed on several occasions that the color produced by the ammonium chloride solution was not as intense as experience led me to expect; on making a fresh solution, and testing this with the reagents used in the former test, a much more intense coloration was produced, showing that the *dilute ammonium chloride solution will not keep indefinitely*, but must be occasionally compared with or replaced by a fresh solution. One of these deteriorated ammonium chloride solutions gave a very satisfactory test for nitric acid, indicating the oxidation of the nitrogen originally present as ammonia.

The suggestion has been made in processes in which 500 c.c. water are used for the ammonia determination to match the color by using a piece of amber glass, the value of which has been ascertained; this I have not found satisfactory when only 100 c.c. of water are used.

A large number of experiments have been made to obtain a *permanent* solution with which the colors obtained in the nesslerized distillates can be imitated and the ammonia estimated; success in this will mean the saving of much time in the determinations, as, after a set of solutions, representing various quantities of ammonia, is once prepared, there will be no occasion for the preparation of ammonia-free water.

SOME SHORTER PROCESSES FOR THE PRODUCTION
OF PHARMACOPŒIAL PREPARATIONS.

BY F. W. E. STEDEM.

The writer desires to call your attention this afternoon to some methods in use by authority of the Pharmacopœia which, in his judgment, could be modified to advantage. It is not his purpose to pose as the author of any of these modifications or changes. He wishes simply to add testimony as to their usefulness and emphasize the desirability of their adoption in future publications of the Pharmacopœia. A few samples are submitted as specimens of finished products made by the methods described. Most of the processes outlined have been in use by various pharmacists for years, and bear the stamp of approval of some of the best men of the land. We will first consider some of the tinctures of the Pharmacopœia.

Tincture Asafetida, as you are all aware, is directed to be made by maceration and then to filter, adding alcohol through the filter until the desired quantity is obtained. This preparation can be made by percolation. Select the asafetida and reduce to a coarse uniform powder. Introduce into a percolator prepared in the usual way, add alcohol in suitable quantity, macerate for forty-eight hours and proceed with the operation of percolation. The advantages are all those of concentration of effort, avoiding the necessity of filtration, reducing the uses of utensils and vessels to the minimum and obtaining a tincture of reliable and standard quality in at most three or four days.

Tincture Calumbæ.—Scarcely a month goes by without the appearance of an article in some one of the pharmaceutical journals relating to this tincture and the difficulty of preparation when the Pharmacopœial process is followed. The whole difficulty can be obviated by carefully preparing the powder No. 20 and proceeding with the percolation and observing the precaution of packing loosely, *not* moistening the drug, as directed by the Pharmacopœia.

Tincture Guaiac and *Ammoniated Tincture of Guaiac*.—These can be easily and quickly prepared by reducing a selected resin to fine powder in a mortar and adding the necessary menstruum gradually, triturating constantly. When most of the resinous matter is dissolved, transfer to a prepared filter and wash the residue and filter

with enough menstruum reserved from the original quantity to make up the measure. The whole operation need not take more than two or three hours, and the results are entirely satisfactory. This has been proven by comparative weighing of residue on preparation of the two tinctures by both processes.

Tincture of Iodine.—Reduce the iodine to a uniform coarse powder. Use a glass funnel and press a plug of absorbent cotton tightly into the neck; lay over this an evenly cut piece of white filter paper. Introduce the iodine into the funnel, and add alcohol carefully. Should all the required alcohol be added and the iodine not all dissolved, reintroduce the weak tincture and continue until the iodine is all dissolved. By careful preparation of the funnel, however, I have always succeeded in completing solution by first treatment. My attention was called to this method by our fellow-member Mr. John H. Hahn.

Tincture Myrrh.—By far the most important of any of the various resinous tinctures is that of Myrrh. The process of percolation is beautifully adapted to the making of this important tincture. Reliable and satisfactory results are always obtained, and the advantages are many, saving of time and cleanliness being not the least important. This process was taught me by my old friend and preceptor, Mr. E. M. Boring, he being the originator of it. I may here add that from this preparation and the successful conduct of it I got the idea of extending the method to all the resinous tinctures of the Pharmacopœia. Prepare a percolator in the usual way. Put in the myrrh (previously reduced carefully to a uniform coarse powder, say 16 to 18) *without* moistening, pack gently, and add menstruum until the liquid wets the cotton of the percolator; close the lower orifice of the percolator, and allow the mixture to stand twenty-four hours, then proceed slowly at first and more rapidly toward the end of the process. An examination of the gummy residue will convince anyone of the reliability of the method.

Camphor Water and Aromatic Waters.—Camphor water can always be had in quantity and without the least trouble if several fair-sized pieces of camphor are weighted with fragments of glass rod or selected clean stones and immersed in a suitable quantity of distilled water. After a few days' standing the water will be found to be saturated. The process is that of circulatory displacement; those particles of water next the camphor, becoming saturated,

ascend to the top of the vessel, and so on continuously. Each time camphor water is required and taken from the vessel an equal quantity of fresh distilled water should be added, as by that means the supply is inexhaustible.

PROXIMATE ANALYSIS OF BARK OF PINUS ECHINATA, MILLER.

BY CHRIS. KOCH, JR.

In the *AMERICAN JOURNAL OF PHARMACY* of January, 1896, the late Professors Bastin and Trimble called attention to the small amount of original research which had been made on the plants of the Coniferae. Together they made a series of general researches—chemical and microscopical—of a number of the members of this order. They also suggested a line of further research.

Acting on these suggestions the writer was prompted to make a proximate analysis of the bark of *Pinus echinata*, Miller, or, as it is commonly called, yellow pine.

This tree is of vast commercial importance. The bark is used for tanning, while the younger trees also figure in the turpentine industry. Its lumber is the well known yellow pine used in all building operations. The lumber is also used for making masts and spars in shipbuilding. The wood is fine grained and, when devoid of the sap or outer portion, is remarkably durable. For a fuller description of this tree the reader can refer to *AMERICAN JOURNAL OF PHARMACY*, 1896, page 199.

Proximate analysis of the Bark.—The bark used for the following analysis was a portion of the same lot investigated by the late Professor Trimble. It was collected at Hammonton, N. J., about December 1, 1895, and was the bark of quite a young tree. It was reduced to a very fine powder, and then treated as follows: A quantity of the bark was macerated with cold distilled water for a short time, and then filtered. The filtrate gave the following reactions: Lead acetate, flesh colored precipitate; ferric chloride, green coloration with green precipitate; gelatin, flesh-colored precipitate; bromine water, yellow precipitate. These reactions all indicated the presence of tannin. The residue on the filter was washed with water. It was then boiled with water and filtered. The cold filtrate was then tested for starch. No starch was found.

Moisture.—A weighed portion of the bark was dried in an air-bath at a temperature of 110° until the weight became constant. The loss in weight was figured as moisture, and amounted to 8.55 per cent. of the bark.

Ash.—This dried bark was then ignited to constant weight. The ash remaining amounted to 1.4 per cent. of the bark. Of this ash, 16.07 per cent. was soluble in water, 39.29 per cent. was soluble in hydrochloric acid and 44.64 per cent. consisted of siliceous matter. The part soluble in water was alkaline to litmus paper. It was tested qualitatively, and potassium, sodium and sulphates were found. The acid solution showed calcium in the form of phosphates. The ash also contained calcium carbonate. The insoluble portion gave the silica skeleton with the microcosmic salt bead.

Extraction.—A weighed portion of the bark was then treated with the various solvents according to Dragendorff's scheme. In each case the solvent was applied in successive portions until it had no further action upon the bark.

In the case of the petroleum ether, ether and absolute alcohol extractions, the successive portions of the same solvent were united and the solvent recovered by distillation. This left the extracted matter in a concentrated form. It was then dried to constant weight, in each case at 110° . After the bark had been exhausted with petroleum ether, it was carefully heated to drive off the last trace of the solvent. This operation was repeated after the ether extraction and again after the absolute alcohol extraction. Each of the three aqueous extractions was made up to a definite volume. In each case an aliquot part of the volume was evaporated to dryness on water-bath, in order to estimate the total solids. The residue so obtained was then ignited, which gave the amount of inorganic constituents. The difference gave the amount of organic solids.

All percentages given in the description of the extracts are based upon the air-dried powdered bark.

Petroleum Ether Extract.—This extract amounted to 1.66 per cent., was solid, of a dark brown color, and had a rosin-like odor. It was first treated with alcohol and filtered.

The filtrate was evaporated to constant weight on a water-bath; the resulting extract was of a dark brown color, had a rosin-like odor, was solid at room temperature, but liquid at temperature of the water-bath. It amounted to 1.09 per cent. of the bark. It was

entirely soluble in ether, chloroform and acetone. Its alcoholic solution gave a precipitate with alcoholic lead acetate, but alcoholic ferric chloride did not affect it. An alcoholic solution of potassium hydrate did not saponify it. The behavior of this substance indicated it to be a resin or resinous matter.

The part insoluble in alcohol was collected on a filter, and air-dried. It comprised 0.57 per cent. of the bark.

It was entirely soluble in ether, chloroform, acetone and carbon sulphide. Its melting-point was taken and found to be 58°. It was slightly saponified by aqueous potassium hydrate, but alcoholic potassium hydrate saponified it entirely. The fatty acids were separated from the saponified matter collected, and their melting-point taken. It was found to be 92°. The behavior of this saponified substance indicated it to be a wax. The odor observed in analyzing the petroleum ether extract was due to a trace of volatile oil.

Ether Extract.—This extract was of a very dark brown (almost black) color, solid at the room temperature but liquid at the temperature of water-bath, and comprised 3.09 per cent. of the bark. It was first treated with hot water. The solids of this aqueous solution comprised 0.84 per cent. of the bark. It was examined qualitatively with the following results: Ferric chloride, green color and precipitate; lead acetate, flesh color precipitate; bromine water, yellow precipitate. These tests indicated tannin.

It also showed traces of reducing and invertible sugar. A portion of this aqueous solution was shaken out with ether in a separatory funnel. The ethereal layer was evaporated and the residue dissolved in water. Neither ferric chloride nor lead acetate gave any reaction with this solution indicating the absence of protocathechuic acid.

The part of this extract which was insoluble in water was entirely soluble in chloroform and acetone, but only partially soluble in ether. The part which was insoluble in ether was soluble in potassium hydrate, but was not precipitated upon the addition of acetic acid, showing absence of phlobaphenes. It was probably some altered resinous matter.

The extract was then treated with hot alcohol which dissolved all but a trace of altered phlobaphene. Upon cooling this filtrate, some of the dissolved portion was redeposited. This deposited material was treated with potassium hydrate which almost entirely

dissolved it. Upon the addition of acetic acid it was precipitated. Ammonium hydrate dissolved this precipitate. It was again precipitated with acetic acid. This precipitate reduced nitric acid. It was found to be phlobaphenes.

The portion of the redeposited material above spoken of, which was insoluble in potassium hydrate was of a pale yellow color and rather flocculent character. It was tested for nitrogen by Lassaigne's method. No nitrogen was found, indicating the absence of albuminous matter.

A portion of the clear alcoholic solution was evaporated to dryness and the residue treated with nitric acid which was reduced. Alcoholic ferric chloride gave a green color, and lead acetate a brown precipitate, all of which indicate phlobaphenes.

Absolute Alcohol Extract.—This extract was of a chocolate color, had a nauseous odor, and was of a porous character. It comprised 9.03 per cent. of the bark. It was first treated with water and filtered.

The soluble matter of this filtrate comprised 3.16 per cent. of the bark. It was made up to a definite volume and examined as follows:

An aliquot portion was completely precipitated with basic lead acetate and filtered. The lead contained in the filtrate was then precipitated with hydrogen sulphide and filtered. The resulting filtrate was then heated on water-bath until the vapor emanating therefrom no longer acted on lead acetate paper. It was again filtered and divided into two equal portions. The first portion was made alkaline and treated with Fehling's solution. The resulting precipitate of cuprous oxide showed the presence of glucose. This precipitate was collected on a filter and washed. It was then ignited and weighed. The percentage of glucose was then calculated and found to be 0.75 per cent. of the bark.

The second portion of this prepared solution was boiled with a few drops of sulphuric acid. It was then made alkaline and treated with Fehling's solution. The resulting precipitate of cuprous oxide was collected, washed and ignited to constant weight. This precipitate was heavier than the precipitate obtained from first portion. This increase in weight was due to inverted sugar. Upon calculating the percentage, it was found to be 0.13 per cent. of the bark.

In another aliquot portion, the tannin was estimated according to the gelatin and alum method. It comprised 0.17 per cent. of the bark.

Another aliquot portion was shaken out with ether in a separatory funnel. The ethereal layer was evaporated and the residue taken up in water and the following tests applied :

Lead acetate	Slight lemon-yellow precipitate.
Gelatin	Slight coloration.
Lime water	Reddish-brown precipitate.
Bromine water	Yellow precipitate.
Ferrous sulphate crystal	No change.
Ferric chloride	Slight green color.

Sodium carbonate did not develop a red color. These tests proved the absence of proto-catechuic acid. The reactions obtained were due to tannin.

The remainder of this solution was shaken out with ether, petroleum ether and chloroform in a separatory funnel. These solvents were applied one at a time, and in each case the solvent was drawn off before the next was put on. The various solutions were evaporated and their residues taken up in water. This solution was tested for glucosides, but none was found. After the above solution had been shaken out with ether, petroleum ether and chloroform, it was made alkaline and again shaken out with ether. The ethereal layer was evaporated and the residue taken up in acidulated water. This solution was then tested for alkaloids with Mayer's reagent, phospho-tungstic acid, gallotannic acid, picric acid, platinic chloride, gold chloride and potassium tri-iodide, none of which revealed the presence of alkaloids.

The part of the extract insoluble in water amounted to 5.87 per cent. of the bark. It was entirely soluble in dilute ammonia water. This solution was precipitated with acetic acid and the resulting precipitate was tested with nitric acid and alkalies. It proved to be phlobaphenes.

Water Extract.—Water extracted 2.18 per cent. of organic solids from the bark.

An aliquot part of the volume was mixed with five times its volume of alcohol and allowed to stand. The resulting precipitate was collected on balanced filter and dried at 110°. It was tested for nitrogen by Lassaigne's method, but none was found, proving it to be a mucilaginous substance. It comprised 0.42 per cent. of the bark.

The alcoholic filtrate was evaporated almost to dryness and again treated with alcohol. The resulting precipitate was collected, dried and weighed. Tested for nitrogen, but found none, which indicated it to be dextrine. It comprised 0.52 per cent. of the bark.

Another aliquot part of this aqueous extract was precipitated with basic lead acetate, filtered and the filtrate precipitated with hydrogen sulphide, again filtered and hydrogen sulphide removed by evaporation. The resulting liquid was then tested for reducing and invertible sugar; it showed only a trace of reducing sugar.

Alkaline Water Extract.—Weak NaOH solution extracted 5.73 per cent. of organic solids from the bark.

An aliquot portion of this alkaline water extract was acidified with acetic acid precipitated with alcohol. The precipitate was washed, collected and dried to constant weight. Lassaigne's test for nitrogen was applied but no nitrogen was found, proving it to be a mucilaginous or gummy substance. It comprised 2.20 per cent. of the bark.

Acidulated Water Extract.—Weak HCl solution extracted 3.51 per cent. of organic solids from the bark.

An aliquot portion of this extract was made alkaline and precipitated with alcohol. The precipitate was washed, collected and dried to constant weight. Did not find any nitrogen, proving it to be pararabin. It comprised 0.70 per cent. of the bark.

The bark having now been subjected to all the solvents, a portion of it was washed with water and tested for starch, which was found absent.

Lignin.—The exhausted bark was now treated with chlorine gas which destroyed 3.72 per cent. of its air-dried weight. The lignin destroyed by potassium chlorate and nitric acid amounted to 52.17 per cent. of the original air-dried bark.

Cellulose.—This was determined by igniting the residue remaining after the destruction of the lignin, and subtracting the ash from this residue. It amounted to 6.14 per cent. of the bark.

Volatile Oil.—125 grammes of the bark were distilled in a current of steam, to examine the bark for volatile oil observed in the petroleum ether extract. The amount of volatile oil, however, was so minute that it did not separate at any time from the aqueous distillate. The distillate had an aromatic, rosin-like odor.

Tannin.—For the purpose of estimating the tanning value of the

bark, the hide powder method was followed. This process showed 10.24 per cent. of tanning material.

The small amount of soluble tannin met with in the course of the above analysis indicates the readiness with which the tannin of this bark changes into phlobaphenes.

An attempt was made to extract and purify the tannin, but this proneness to decomposition again asserted itself.

125 grammes of the bark were exhausted with acetone, and the solvent recovered by distillation on the water-bath; the extracted matter was then treated with water, and the mixture filtered to remove insoluble substances. The clear filtrate was agitated with acetic ether, and subsequently saturated with sodium chloride.

Upon separation of the acetic ether layer and recovery of solvent, very little residue was obtained. Upon treatment with water this was changed almost entirely into phlobaphenes.

A small sample of the extracted tannin of *Pinus echinata* was obtained from the collection of tannins owned by the late Professor Trimble.

It was of a reddish-brown color, had a bitter astringent taste and was sparingly soluble in water. Its aqueous solution gave the following reactions:

Lead acetate	Flesh colored precipitate.
Bromine water	Yellow precipitate.
Lime water	Brown precipitate.
Ferric chloride	Green color and precipitate.

The material was treated with several successive portions of ether to remove any soluble matter and afterwards thoroughly dried at 110°.

The dried material was submitted to ultimate analysis with the following percentage results:

	I.	II.
Carbon	58.36	58.74
Hydrogen	4.93	4.78
Oxygen	36.71	36.48

The results of the combustion as well as the qualitative tests, show this tannin to belong to the oak bark tannin group and not to the gall tannin group.*

* See Trimble's "The Tannins," Vol. II, p. 132.

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IMMUNITY TO POISONS.

BY WILLIAM B. THOMPSON.

The remarks of the editor of this JOURNAL on the apparent immunity of fowls from the toxic action of drugs prompts the following thoughts :

The immunity of certain animals to the action of poisons and of poisonous drugs, finds an analogy to some extent in the resistance which the insect tribe appear to have against the acrid, irritant and destructive character of many substances. Take the well-known ravages, in depredation, upon cantharides, capsicum, *et al.* The impunity shown is a marvel to the understanding. These animate creatures, large and small, obey, of course, one common implanted instinct, namely, the quest for food. Although they may not always be revelling in the choice of their pabulum, they have a faculty of adapting circumstances to their wants and of securing a supply from one source or another. It is a puzzle to our minds that *they* continue to exist and flourish when our more acute senses revolt and our sense of danger cautions. The benign Creator has withheld from these creatures a keen sense of discrimination between the hurtful and the harmless, and, therefore, as a compensation, perhaps, he may have constituted the lower orders less vulnerable to the action of poisons.

Animals, generally, are not endowed with a premonitory sense of danger, therefore they do not have this safeguard so inestimable to *our* lives. The lamb follows the executioner to the slaughter, unconscious of impending death, although the fatal axe may be swinging in full view of the beast.

The immunity of fowls (if credibly ascertained) against the toxic action of nux vomica, is not readily explained, because their processes and function of digestion and assimilation *are* quite similar to ours, —consider the rigid, muscular strength of the gizzard. It would, therefore, seem that there is the same general provision in this case for the decomposition of food as exists in the carnivora, or as in man, with his varied and miscellaneous diet. Digestion and excretion are far more rapid in the lower than in the higher class of animals, notably in birds. The separation of that which is required from that which is valueless is a rapidly performed process in the former, and we assume that the fact is established that the carnivora are much more susceptible to the action of poisons than

the herbivora. In fact, the whole subject of animal chemistry invites close thought and study—its operations being by no means, as yet, fully comprehended.

With regard to the utility of spent drugs as a basis of poultry or other food, experimentally, would require caution. Starch, gum-wood-fibre are undoubtedly left as residuum, and any adaptation might rest upon the fact that in the instinct for food, nature seems inclined to demand bulk. In this bulk there is always, as we know, a very large proportion which is useless or valueless. But nature, as we term the vital processes, seems to prefer to make her own selection, and there must be enough bulk of substance for the muscular grasp to take hold of. In all the economies of practice, the utilization of waste constitutes wealth—this is a highly important consideration in every department of industry.

A NOTE ON CARDAMOMS.

BY FREDERICK L. LEWTON.

A paper by Daniel Hanbury on "Some Rare Kinds of Cardamoms," appearing in the *Pharmaceutical Journal* of February 1, 1855, contained careful minute descriptions of the cardamoms of Siam, Cochin China, Tonquin and China, illustrated by excellent wood-cuts; references to other published descriptions, and notes upon the properties, uses and commerce of the several varieties.

The natural order to which the cardamom belongs was a particular favorite of this great man.

Joseph Ince, in his memoir of Daniel Hanbury, says: "He worked on the Zingiberaceæ as though he loved them; amusing were his private comments on those who without much real learning had ventured on the intricacies of the theme, and had longer life been granted, Hanbury would have amplified and extended to the utmost a line of investigation which possessed for him a peculiar charm."

In addition to the numerous samples of cardamoms procured directly from authentic sources, Hanbury studied the specimens of Loureiro, Pareira and other investigators, which had been deposited in several European museums. In the article mentioned above he frequently states, after giving a minute description of some rare variety, that the specimen in question may be found in the Museum of Natural History at Paris, or the British Museum, or some other such institution.

In 1873, eighteen years after the publication of Hanbury's paper, among the thousands of objects exhibited at the Vienna Exposition, there were exhibited samples of cardamoms from Siam and China, agreeing perfectly with the descriptions of the rare kinds in Hanbury's paper. These samples are in the Philadelphia Museums, and when supplemented by a series of specimens collected some fifteen years ago in the bazaars of India, and others showing the commercial varieties of to-day, they make the most interesting collection of cardamoms ever gotten together.

Many of the specimens comprising this collection were received, labelled simply "Cardamoms," and their identification at the Philadelphia Museums with Hanbury's excellent descriptions, published nearly fifty years ago, have proved a most interesting study.

A case of cardamoms exhibited by the Siamese Government at the World's Fair in 1893, was labelled "Wild or Bastard Cardamoms." It was found upon examination to contain a mixture of fully ten distinct varieties, some belonging in the genus *Anomum*, and others to the nearly related genus, *Alpinia*.

Pharmacists and all engaged in the handling of cardamoms will do well to examine the collection in the Philadelphia Museums, as a number of these varieties have little or no aromatic properties and the same might be foisted upon them instead of the official drug.

LOCALIZATION OF ALKALOIDS.—Nicotin is contained, according to Wijsman-Leyden (*Sudd. Apoth. Zeit.*, 1898, 636), as a rule, in the cells underneath the hairs. It is also found in the cells of the upper epidermis. The question is, therefore, an open one as to whether it is contained in the protoplasm or in the vacuoles. If one removes a piece of the upper epidermis of a tobacco leaf and places it in an iodine solution the nicotin reaction occurs immediately, in the form of a brown coarse-grained precipitate, at the basal end of the under cell. The precipitate then extends along the side walls. The reason for this slow action along the side walls of the cells of the hair lies in the fact that the latter like the outer walls of the upper epidermal cells are cutinized so that the iodine solution enters slowly. It appears as if the nicotin is dissolved in the cell sap (vacuoles).

If cells containing berberin are plasmolyzed with concentrated nitric acid, the contents at the point where they are concentrated are colored darker. After awhile the vacuole wall disappears and the nitric acid penetrates into the vacuole. Then there appears a granular precipitate of berberin nitrate, which soon begins to crystallize. The vacuole is filled with groups of crystals of berberine nitrate, which, by and by, occupy the whole space, and after the vacuole collapses remain as sphere crystals.

THE STUDY OF STARCH GRAINS AND ITS APPLICATION.¹

BY HENRY KRAEMER.

The object of bringing this paper to the attention of the National Pure Food and Drug Congress is two-fold. While it has primarily to do with some studies that were made preliminary to an examination, which was requested of the writer several years ago, by Prof. J. U. Lloyd, on the subject of flour and its adulterations, it is given at this time to indicate the necessity of the co-operation of the specialist in biological work with the chemist in determining the standards of purity of drugs and foods.

The compounds that man extracts from the plant, or which make a plant useful to him as food, are likewise food compounds for the use of the plant. These food elements are only to be found as products of constructive metabolism and are sooner or later used by the plant in building up new cells, etc. These highly elaborated and complex food products are invariably, at one time or other, stored by the plant in some one of its members. Naturally enough, the place of storage is dependent upon the surroundings of the plant. In the plants of the hot and burning deserts they are stored either in roots (as asafœtida), or stems (as cacti), or leaves (as in the century plant). In the plants of the temperate regions the rhizome or leaf scales or leaf buds contain this nutriment. It may be further said that all plants provide their offspring—whether seeds or spores—with enough nutriment to sustain them until they can provide for themselves. In some cases food is also contained in special parts to assist fertilization in the flowers and dissemination of the seed.

Almost all of the food materials which man obtains from the plant kingdom are obtained from these reserve supplies. They may be found in tuberous roots (as sweet potato), tubers (white potato), leaf scales (as onion), bud scales (as asparagus), fruits (as tomatoes, bananas), or seeds (as peas, corn, wheat, etc.). It may also be said that whenever these food supplies are contained in the plant they are frequently naturally protected (as shown by the investigations of Stahl) by means of principles that are poisonous to the animal world. In some cases by the process of cultivation and selection, these principles may be increased or diminished according to the treatment.

¹ Address to the Pure Food and Drug Congress, Washington, D. C., January, 1899.

For instance, in white potato the alkaloid solanine is decreased whereas in cinchona and opium the alkaloids are increased by process of cultivation.

ORIGIN AND FORMATION OF STARCH.

We now come to consider the first visible product of constructive metabolism of the plant, viz.: starch. It occurs in the plant as an assimilative product and as a reserve product. In the former condition it is found in all the green parts of plants at the close of day in the summer when the sun has been shining upon them. As a reserve product it is found in roots, rhizomes, barks, buds, fruits and seeds.

The assimilative starch is synthetically produced from the inorganic compounds, carbon dioxide and water, and results only when the chloroplastid is present and the plant is supplied with light and salts of potassium. It has been supposed that the reaction may be represented as follows: That 5 molecules of water and 6 of carbon dioxide produce 1 molecule of starch with the liberation of 6 molecules of oxygen.

There is no doubt that there are simpler products first formed, and it is supposed, from the experiments of Bokorny, that formaldehyde is one of the primary compounds. This experimenter removed all starch from specimens of *Spirogyra*, and then fed them in the dark with a sodium salt of formic aldehyde. Starch was rapidly formed in the chloroplastids, thus indicating the possibility that other compounds are formed before we have the product finally formed which we recognize as starch.

It has not been possible as yet to demonstrate the successive steps in the process of development of starch. All that we can say is that the production of starch normally is dependent upon the following conditions, viz.: light; air containing CO_2 and moisture; and that the organ in which it is produced is the chloroplastid, when associated with protoplasm. The chloroplastid consists of a ground substance, and a pigment which again is made up of a green (chlorophyll), a yellow (xanthophyll), and also a reddish fluorescent principle. Very many experiments have, however, been made to determine what part the chloroplastid and protoplasm play in the production of starch, and necessarily numerous theories have been proposed. One view was (that by Sachsse) that the chlorophyll

itself is changed into starch. Another view is that the protoplasm is changed into starch. In opposition to these chemical theories we find also physical theories. These are based upon the difference in the character and action of the rays of the sun, which are absorbed by the chlorophyll, and those that pass through it. These results have been obtained by the examination of solutions of chlorophyll by means of the spectroscope. One view, which is supported by Lommel and Müller, and apparently confirmed by the observations of other investigators, is that the rays—more especially the blue and red—which are absorbed by the chlorophyll are changed into some other form of energy, which is able to make starch synthetically out of carbon dioxide and water. Pringsheim, on the other hand, considers that the chlorophyll acts as a filter of the rays of light, and that those absorbed are not active in the work of assimilation, but on the contrary interfere with the process, so that those that pass through are the rays which effect the production of starch. It is also held that just as there is a combination in the blood between hæmoglobin and oxygen, so the chlorophyll combines and fixes carbon dioxide. It is difficult to decide just what is the process in the manufacture of starch by the plant, and it is not unlikely that the rays absorbed by the chlorophyll are those directly concerned in the process, as a number of investigators have found that the production of starch is much more energetic in green plants when exposed to those colors which are absorbed by the chlorophyll solution to the greatest extent. And yet who can say that the secret of life does not lie here in the chloroplastid, that it is not only the mill which supplies the world with its food, but it is also the organ which changes the energy of the sun into vital energy. It may be that the sun is the source of the energy, the carbon dioxide and water the materials, and the chloroplastid the laboratory whereby vital energy is created and bound and held in the substance which we call starch. If we stop a moment to consider this we will find that the animal creation is wholly dependent for its energy upon the starch grain produced in the plant. If the plant (as clover), or seed, or fruit (as oats, etc.), is consumed by horses, the energy of the starch grain is changed to horse-power. If the plant is consumed by cows it becomes milk and meat, and may in turn furnish us energy. From these products of the animal creation as well as from the plants directly, we obtain our power to live and act, *i. e.*, the energy we possess

comes to us and every animal from a kind of potential (probably vital) energy stored in the plant, which the latter has received from the kinetic energy of the sun. The value of one food over another lies in the amount of stored energy that it contains, and which is ordinarily calculated as fuel value. From the consideration of the plant along these lines, some have defined the plant as a machine for storing energy.

KINDS OF STARCH.

It was stated that if we examine the chloroplastid at the close of a day in summer, when the sun has been shining brightly upon the plant, we would observe, by proper manipulation, minute starch grains, called *assimilation starch*, in each chloroplastid. If the latter is examined in the early morning, it will be found to be comparatively free from starch; and the question arises, what has become of it? We find that during the night it has been changed into soluble carbohydrates by the aid of ferments and other substances, and, as such, transported to the portions of the plant that require food. If this process takes place during activity of growth in the plant, it is transmitted to the growing point of root, stem or leaf, etc., and is utilized in the building-up of new cells, etc. In many of the cells through which the solution of carbohydrates passes *en route* to the growing point, or even at the growing point, it may be transformed back to starch by a colorless chloroplastid, called leucoplastid. Starch that is produced in this manner, and being in a transition or resting stage, awaiting further orders or calls, so to speak, before going further, is spoken of as *transitory starch*. The starch in the medullary rays, as well as in other cells of the wood and bark of plants, is of this character, and distinguished by being in the form of rather small and nearly spherical grains.

After the production of the elements (as roots, branches with leaves, flowers, etc.) required for one year's growth, most plants, as a rule, provide food for their next year's growth, if they survive, or for that of their offspring. The character of the provisions laid by depends upon the nature of the plant and the conditions under which it develops. While starch is commonly the principle stored for this purpose, in some cases other substances represent the reserve product, as cellulose (in *nux vomica*), oil and proteids (in mustard), etc. Oil replaces starch in seeds which are to be transported to

some extent by the agency of the wind; whereas it is replaced by cellulose in seeds where germination is a long time in being effected. Starch, however, is the substance most generally stored by the plant, and this is found in connection with other principles, as oil (in corn) and proteids (in wheat), etc. The starch which we find in rhizomes, tubers, bulbs and seeds owes its origin, like the transitory starch, to the leucoplastids which change the sugar solutions which they receive through the moving protoplasm back to a more stable form, viz., the starch grain. It is then called "*depot*," "*storehouse*," or, more frequently, "*reserve*" starch. The starch grains of this class differ from either "transitory" or "assimilation" starch in that they are, as a rule, quite large and the grains are more characteristic for the different plants in which they are produced; this is especially marked in the starch we find in rhizomes, tubers and other metamorphosed stems.

ORIGIN OF GROWTH OF GRAIN.

This brings us, then, to the consideration of the starch grain itself. In some cases we observe a distinct centric or eccentric marking, around which lamellæ or layers may extend. The centric or eccentric marking is spoken of as the "hilum" or "nucleus" of the grain. The terms "hilum" and "nucleus" are, however, open to criticism, inasmuch as they are employed in botanical language for another specific purpose. The expression "point of origin of growth" would be better on account of its being less confusing, and is, moreover, descriptive and accurate. The "point of origin of growth," is the part of the starch grain that was first formed by the plastid and according as new products were added we have a nearly spherical or elliptical or irregular shaped grain.

The point of origin of growth in some starch grains is only discerned by the use of reagents or polarized light. When it is distinct it may be described as being either a nearly spherical mark, or a distinct fissure. In some cases there are several fissures which cross one another. All of these marks are to be employed practically in distinguishing those starch grains in which it is possible to discern the botanical source.

CONSTITUTION OF STARCH GRAINS.

We have observed in some grains, as the result of additions or growth, that there are layers or lamellæ. What does this mean?

Does it indicate resting periods in the growth of the grain, and that as each layer is added there is a strong demarcation—or does it mean that we have layers differing in composition, etc.? This brings us to consider the composition of the starch grain and the meaning of the different layers. If we consult any of the standard works on organic chemistry, we find the formula for starch given as $C_6H_{10}O_5$. This formula gives us simply the proportion of the elements carbon, hydrogen and oxygen, without any scientific or practical information in regard to either its physical or exact chemical composition. On the other hand, the starch grain has been the subject of much interesting investigation by botanists. In fact, what is to be considered one of the greatest intellectual feats of the century was the study of the starch grain by C. Nägeli. Previous to this time several hypotheses had been given as to the origin of starch grain: (1) It was considered to be a bubble filled with a liquid ("Flüssigkeit gefüllten Blase"). (2) Then it was considered (1834) that from a centric or eccentric point, layer after layer was added. (3) Payen (1838) conceived the idea that growth took place from the outside towards the centre. (4) By others (1845) it was considered that growth of the starch grain was like that of the cell wall. Nägeli, in 1858, announced that growth of the starch grain was effected by the interpolation of new material among the particles already formed. He advanced the idea that the starch grain consisted of elementary particles or molecules which were made up of atoms (Stärkeatome or starch atoms) consisting of C, H and O.

Later, inasmuch as the term molecule was being employed by chemists to mean something different from what he had in mind, he invented the term *micellæ*, meaning thereby that each micella consisted of larger or smaller numbers of chemical molecules. These micellæ were described by him from the interference of colors observed with the polariscope as being "biaxial crystals and he assigned to them as a probable form, that of parallelopipedal prisms with rectangular or rhomboid bases." He said each micella has a watery film (Wasserhülle) and is surrounded by a mother liquor which is different in composition from the micellæ. The latter, with their watery films, are "held together by the following forces: (1) The attraction of the micellæ for each other, a force which varies inversely as the square of the distance between them; (2) the attraction of each micella for the water which surrounds it, a force which

varies inversely as some higher power of the distance; and (3) the force which holds together the ultimate chemical molecules of which each micella consists."

The development of the reserve starch grain does not consist simply in taking up sugar (Glycose), but consists in its transformation into starch. To this end the micellæ do not alone suffice, as the starch grains cease to grow when removed from the plant-cell, and are put into a sugar solution. The property (molecular kräfte) of living protoplasm must in some way contribute to bringing about this change by polymerization of the sugar-holding solution, between the micellæ, into starch substance. The new starch substance which is formed is utilized in part in increasing the size of the micellæ already formed, and also to form new micellæ, which develop and arrange themselves according to the laws that the micellæ already formed have obeyed. In this manner we have growth of the starch grain by means of the interpolation of new material between that which has already been formed, and this has given this theory the name "Intersusception Theory," to distinguish it from that in which new layers are supposed to be added upon those previously existing.

C. Nägeli has further shown that the starch grain consists of two different substances—one which is soluble in ferments, and called by him granulose, and the other which is insoluble in saliva, and called by him starch cellulose. He showed that the layering in starch grains was due to a difference in the amount of water in the different layers. This has given rise to the formula suggested by W. Nägeli for the starch grain which is $6\text{C}_6\text{H}_{10}\text{O}_5 + \text{H}_2\text{O}$, or $\text{C}_{36}\text{H}_{62}\text{O}_{31}$. Krabbe, on the other hand, claims the layering to be due simply to lines of contact between the separate lamellæ. In 1883 Schimper showed that all starch grains developed within plastids, and that, in the reserve starch grains, the leucoplastids finally disappeared. C. Nägeli was not cognizant of the presence of leucoplastids, these having been discovered after his early investigations, and he believed that while some starch grains arose in plastids the most of them arose free in the cell sap. Schimper's studies further showed that the outer portion of the grain was the youngest, and he also expressed the idea that starch grains were made up of sphere crystals of crystalloides, and called them "Spharokrystalloide."

In 1895 Arthur Meyer published a work on the starch grain, in

which he considers it to be made up of (1) α -amylose; (2) β -amylose, and (3) amyloextrin, a decomposition product of amylose. He also believes that inasmuch as there is an anhydride of dextrose which does not readily take up water there is probably also an anhydride of amylose which even on boiling with water is hydrated with difficulty, and this is the substance that has given rise to the hypothesis that there is present a starch cellulose. This latter term has been used for a number of different substances: (1) Mixtures of amyloextrin and α -amylose; (2) solutions of α -amylose and β -amylose; (3) solutions of β -amylose with various substances as nitrogen-holding substances, impure fatty products, pure amyloextrin, and the walls of plant cells which are contained in commercial starches unless carefully purified. He obtained the α -amylose upon treating starch paste (Stärkekleister) with malt solutions (Malzauszug) and by the action of hot dilute solutions of hydrochloric acid upon the whole starch grain. The portion (β -amylose) remaining is distinguished from the portion dissolved, in that it is not soluble in water and becomes slightly reddish in color, and not blue with iodine solutions.

He considers the starch grain to be made up of two kinds of acicular crystals (which he calls "Trichiten"), viz.: α -amylose and β -amylose, and that in certain starch grains which are colored red with iodine and not blue, there is also present amyloextrin and dextrin. He further says that most starch grains consist altogether or nearly so, of amylose, and that such are colored pure blue with iodine. These latter starch grains are made up of sphere-crystals of amylose, arranged in layers, and these layers may consist of crystals of either α -amylose or β -amylose, or both, and that some starch grains contain in addition large amounts of amyloextrin and dextrin, as in *Iris germanica*, *Gentiana lutea*, *Oryza sativa*, some orchids, grasses, etc.

MICRO-PHYSICAL EXAMINATION OF STARCH GRAINS.

Starch grains generally occur in isolated grains. Not infrequently, however, they are found in groups of 2 to 4 grains, when they are distinguished as 2-, 3- or 4-compound. In rice they are from 4- to 100-, in oats as many as 300-, and in spinach as numerous as 30,000-compound. The individuals of compound grains are in some cases easily separated from each other. This separation of the grains

occurs frequently in the mounting of the specimen, and is especially noticeable as a result of the processes to which the plant has been subjected in the manufacture of food and medicine. The single grains thus separated are more or less angular. It sometimes occurs that a single starch grain possesses apparently 2 points of origin of growth, when it is spoken of as being half-compound.

While there is considerable variation in the shape of the grains isolated from different species of plants, there is also a greater variation in the grains from different, or even the same, plants of the same species. This variation more frequently occurs than is generally supposed, so that the greatest care must be exercised in utilizing the shape alone in determining the botanical source of the grains present in the specimen under examination. There is also considerable variation in the size of the grains not only from the same plant but even in the same cell.

Some foods and drug products are variously treated in preparing them for the market, and there is necessarily more or less of an alteration of the typical starch grains. For instance, they may be treated over the naked fire as jalap root, or moistened and dried either by exposure to the sun or near a fire as in guarana, or in hot water as aconite tubers. In such cases the starch grains are changed to swollen masses or are more or less corroded.

One of the most striking properties of starch grains is that when viewed by polarized light they show a neutral cross which extends from the point of origin of growth to the periphery of the grain. This neutral cross appears to turn as Nichol's prism is revolved and to produce the various colors of the rainbow. We likewise find that starch grains from different sources do not behave alike towards polarized light. The distinctness of the cross as well as the kind of colors produced, as Nichol's prism is revolved, varies considerably, and we are inclined to the opinion that this subject is well worth careful study from a practical, as well as scientific, standpoint.

MICRO-CHEMICAL EXAMINATION OF STARCH.

It has already been shown that most starch grains give a blue color when treated with iodine solutions, but that some are turned red by the employment of this reagent. It is supposed by some investigators that there is an actual chemical combination which

takes place between the iodine and starch. Meyer, on the other hand, does not consider the so-called iodide of starch to be either a chemical combination or a mechanical mixture, but says that it is "ein wohl definirte blaue Lösung von Iod in Stärke."

It ought to be borne well in mind that between the pure blue and red reaction of starches, intermediate colors may be produced, depending on the varying amounts of dextrin present.

Another important fact that may be mentioned in this connection is that if the aqueous solutions of iodine contain hydriodic acid, or if alcoholic solutions contain ethyl iodide, there is produced according to the amount of these foreign substances, as well as the character of the starch, colors which vary from yellowish or reddish-yellow to reddish or reddish-blue or even purple.

The starch in plant cells which is still surrounded by the plastids or imbedded in other materials, as resin, may be determined by means of a chloral-iodine solution, which clears the other substances and causes a swelling of the grains which are at the same time colored blue. It is useful in certain cases when much resin is present to dissolve out the starch by heating the sections in glycerin, and on the addition of excess of water the starch will separate from the solution in the form of minute grains.

A still more characteristic property of starch grains is that when they are heated in contact with water to 45-77° C., they swell and form a pasty mass. The temperature at which the different starches begin to form a paste is likewise deserving of practical consideration.

Not only do starch grains swell when heated with water, but they swell upon treatment with various reagents, as chloral, potassium hydrate, chlor-zinc-iodide, chloral-iodine, etc.

Various investigators since the time of Nägeli, who appears first to have experimented with the action of saliva on the starch grain, have used this and other ferments, as well as other substances, as reagents in the examination of starch. All of this work has been done by botanists, and has been for the purpose of ascertaining the composition and structure of the starch grain. There is, however, a very practical application to be made of the character of the interaction between reagents and starch grains; considering in this connection the amount of time and temperature required to complete the reaction; and the strength of reagent, etc. The writer has made

some experiments in connection with Florence Yaple on commercial starches, as well as the starches in the cells of the tuber of potato and fruits of wheat and corn, with the following reagents:

- (1) Chloral iodine + iodine solution; of each 5 parts.
- (2) Chlor-zinc-iodide solution.
- (3) Chromic acid solution (15 per cent.).
- (4) Calcium nitrate solution (30 per cent.).
- (5) Chloral solution (saturated), water and glycerin; of each 3.3 parts. To this solution as much iodine is added as the solution will take up.
- (6) Saliva,
- (7) Silver nitrate (2 per cent.).
- (8) Sulphuric acid (C. P. acid 90 parts and water 10 parts).
- (9) Taka diastase (saturated solution).
- (10) Sodium acetate solution (50 per cent.).
- (11) Potassium hydrate solution ($\frac{1}{10}$ of 1 per cent.).
- (12) Potassium nitrate solution (saturated).
- (13) Tannin solution.
- (14) Potassium phosphate solution (saturated).
- (15) Hydrochloric acid (5 per cent.).

The numerous drawings which we present, indicate that there are characteristic results obtained by the use of these reagents. I will not take the time, however, to consider the details of the aforesaid experiments, as they will be incorporated in a subsequent paper to be presented before the Cincinnati Section of the American Chemical Society.

An examination of the commercial starches shows that there are certain amounts of impurities associated with them which may further serve as a means of identification. Meyer has shown that potato starch contains from 0.27 to 0.62 per cent. of mineral substance; the amount of water is generally about 20 per cent.; and that it generally contains about 0.322 per cent. of nitrogen; there is also present a body which is soluble in ether and which gives a bad odor on heating a solution with hydrochloric acid. The starch may be purified by washing with water containing ammonia which does not alter the starch grain as potassium hydrate does.

Wheat starch of commerce reacts acid and contains lactic acid, acetic acid and protein matters. Rice starch gives an alkaline reaction.

APPLICATION OF THIS KNOWLEDGE.

From what has been said it is apparent that we are for the most part indebted to botanists and pharmacognocists for the advancements made in our knowledge of the constitution and composition of starch grains. This follows as a natural sequence of their studies in the plant kingdom. It may be noted that there are many facts at the command of the student of botany which may be turned to practical account in the study of this and similar subjects. It has been shown in this article that micro-physical and micro-chemical examinations reveal an abundance of information which might be turned to practical account in the study of plant products containing starch. I am aware that this Congress has met to secure the desired legislation on pure foods and drugs and prevent undesirable amendments, but it is extremely important that it shall also consider what departments of science shall furnish the judges who shall determine what the standards of purity shall be. It is exceedingly important, and, indeed, absolutely necessary that every precaution should be taken to insure the public who use the foods and drugs, as well as the business man who manufactures and supplies these products, that there is a standard that can be determined and that is just and fair. It is very manifest, from the complications which have arisen by reason of food and drug legislation thus far enacted, that a certain amount of odium attaches to pure food and drug laws. This arises because of the difficulty of securing officers who understand either natural and practical conditions in the manufacture or commerce of these products, and who have been sufficiently trained and developed in all of the sciences which are involved in the study of the origin and manufacture of them, so as to comprehend the possibilities of either truth or error. Unless there is an advance in the action of this Congress in deciding who are to be the judges of purity and adulteration in foods and drugs, over that of previous legislative acts, it is not unlikely that considerable trouble and annoyance will be caused the most conscientious manufacturers and business men rather than those who wilfully adulterate or admix their products. One of the first steps of this Congress should be to make sure that there is sufficient scientific knowledge at our command which can be utilized in establishing standards of purity, etc., and that there are sufficient competent

practical persons able to carry on this work with justice to consumer and producer. A legislation that is based on ignorance is arbitrary and is surely not what this Congress desires. The legislation must be based on knowledge—and this knowledge must be manifest not only in the ability of legislators to frame laws, but they must see far enough that in the application of the laws through the judges of standards, it is not the manufacturer or seller of pure foods and drugs that is to be inconvenienced, but that he who adulterates these products shall be punished.

Some years ago it was considered necessary to present arguments upon the value of the microscope in the study of drugs. It is noteworthy that during the past year scarcely a paper has appeared on this subject in the pharmaceutical world, and it appears that all of our colleges and schools of pharmacy are utilizing the simple and compound microscope and giving a more or less thorough training in the study of botany (particularly of the plant cells and their contents), preparatory to the study of crude and powdered drugs, foods, etc. It has been shown by the author on a number of occasions that the microscope is not only sufficient, but absolutely necessary in some cases in determining the purity of a drug, food or spice. It is needless to repeat that this instrument is safe only in the hands of him who is thoroughly trained in the sciences the subjects of which are involved. The products of the animal kingdom can only be examined authoritatively by the zoologist; those of the plant kingdom by the botanist, etc. It may be necessary to illustrate the above remarks with one or two examples, indicating the value of the microscope to the specialist. Recently a sample of black pepper was submitted to the writer which was supposed to have been adulterated with cayenne pepper. A chemical examination gave no clue to the problem. But by means of the microscope the adulterant was detected with certainty. Some years ago a fruit jelly was upon the market, which was sold at an unusually low price. It was naturally supposed to be adulterated; but with what, was not known until by means of the microscope the presence of a diatom (*Arachnoidiscus Ehrenbergii*) was revealed. The next question was where and upon what does this diatom grow? It was found that it grew only upon certain seaweeds in the waters near Japan, and not upon fruit trees in France, and this led to the conclusion that the jelly was made from

this seaweed. These examples are sufficient to indicate how long are the ways that lead to the solution of the problems that concern this Congress. It may, therefore, be asked how much training shall be represented in its Board of Judges of Standards? Would it not be better to err on the side of having more sciences represented and more men of special training than by limiting the knowledge which this Board shall possess? Some may say that no limit is indicated. It is nevertheless manifest in its prescribing that chemists and medical doctors shall decide on the standards to be adopted and that it does not specify any one who is a student of either of the two kingdoms that yield us our important foods and drugs.

If more attention could be directed rather in the direction of strengthening the scientific part of the work involved by this Congress and assuring the manufacturer of pure products that he will be protected, and that he who adulterates will be liable to punishment, than to the philosophy of food legislation, the cause would be strengthened materially and a desirable condition at a not very far distant day realized. If it were not for the fact that the importance of this subject is scarcely realized even by the chemical analysts themselves, I would not bring it forward in this rather forcible manner. Only recently an analyst of some reputation sent to my laboratory to ascertain the reagents which were employed in detecting adulteration in spices. He desired this information to examine certain products that he had received from another State, in which the quality of the products had been questioned. I replied "that I employed at the most but three or four reagents, including mounting media, and that it was not so much color reactions as it was ability to determine tissues and their contents that was necessary for work of this kind, and that this only would follow prolonged and careful training in the examination of plant tissues and their contents." We know that iodine gives a blue reaction with starch, but we have also seen that our knowledge of the starch grain is far more extensive than this, and that for purposes of identification much other work must be done.

The foregoing remarks apply likewise to many related subjects, as stone cells, pollen grains, etc. In the black pepper examination referred to above, the adulteration was determined by the presence of the characteristic-shaped stone cells of the seed coat of cayenne

pepper. The crucial test is not the absence or presence of tissues or contents, which give a characteristic stain or reaction; but it is what both a micro-physical and micro-chemical examination yield the botanist and pharmacognocist.

Some may object to my remarks in that I lay too much stress on the training necessary for research work of this kind. Time will show that competency in setting standards for, and in examining, foods and drugs is acquired only by proper training. This training cannot be too broad, and at the same time specific. The chemical analyst spends four to seven years in attaining competency. How can any one consider, then, that a few days or weeks are all that is necessary to make one competent to pronounce on commercial food and drug products which require for their examination a knowledge of the foundation-stones and principles in other sciences of which he may know comparatively little, if anything. A chemist may use a microscope, so may a lawyer, but it is not to be supposed that they can use it with the same degree of certainty and skill as one who has been trained in its use. Of all the instruments yet devised in the prosecution of scientific research, there is none that requires that its user shall be better taught in the foundation and guiding principles of the science in which he engages than the microscope.

The chemist may make a chemical examination of water, but it requires the bacteriologist (or specialist in another department of science) to make a biological examination of the same. The knowledge of the latter is as essential, if not more so, in some cases, than the former, and, in fact, unless made may result in an error in the deductions that are drawn. It may also be said that the chemist may make a chemical analysis of foods and drugs, but a biological examination requires the aid of the biologist, *i. e.*, the specialist in botany and zoology. As in the examination of water, so in the examination of these products, the different sciences mentioned should work conjointly, each contributing its share to the truth. This is the age of specialists, and, even in the different departments of science, we have a further division of labor among experts. We believe that the best efforts of this Congress will be served and materially strengthened if not only the division of chemistry of the United States Department of Agriculture, but the other divisions of the department that can furnish material assistance in this work are

instructed to furnish experts; and if, in addition to the chemists of the American Chemical Society and physicians of the army and navy, the pharmacists of the American Pharmaceutical Association are invited to send representatives. There is no question but that such action—the bringing together of experts in the different departments as its judges of standards—would place the Congress in good faith among all who are concerned in pure food and drug legislation. This part of the subject is deserving of your most earnest consideration, as, to my mind, it is the keystone of all food and drug legislation. When this is decided, there will be no difficulty in framing a law that is at least rational, and which may be perfected as the judges of standards of purity are enlightened and manufacturer, merchant and consumer recognize its justice.

RECENT LITERATURE RELATING TO PHARMACY.

LIMED ALTHÆA.

It is well known that considerable althæa is limed to improve its appearance, and the test for its detection has been treatment with diluted hydrochloric acid, saturation of this with ammonia and addition of ammonium oxalate when the calcium is precipitated.

Fromme (*Ph. Rundschau*, 1898, 631) finds all althæa naturally contains some lime, and that the above test will invariably give positive results, even with unsophisticated specimens, hence is a worthless criterion. He recommends the following test, which affects only large quantities of lime.

Two grammes cut althæa in a small plain filter is washed with 5 c.c. 1 per cent. solution of hydrochloric acid and the filtrate rendered alkaline with solution of soda. No precipitate should occur.

H. V. ARNY.

SEPARATION OF THE TARTARIC ACIDS.

According to A. Hollemann (*Chem. Zeit.*, 1898, 134) these acids can be separated by the fractional crystallization of their calcium salts, racemic acid being usually the first to crystallize out. The three salts can be readily distinguished under the microscope; the dextrogyre being in prisms or rectangular plates; the inactive in quadratic or rhombic crystals; while the racemic salt appears in elongated rhombic plates.

H. V. A.

CONSTITUENTS OF CORK.

E. Kennert gives (*Ph. Centralk.*, 1898, 699) a preliminary report on investigation of cork, in which he confirms the presence of vanillin, which is separated from the ethereal extract by agitation with solution of sodium hyposulphite. Evaporation of the ethereal extract yields a residue, from which, with cold ether, can be separated a wax, which, on boiling with alcoholic potassa, yields an acid and an alcohol which has not yet been fully investigated.

From the ethereal residue mentioned above, after boiling with sodium carbonate and then with potassa, washing and drying, acetic ether extracts cerin, which the author purified and analyzed, finding its empiric formula to be $C_{30}H_{52}O_2$ or $C_{32}H_{54}O_2$. It yields an acetyl and a benzoyl derivative, and is allied to physosterin.

H. V. A.

THE ACTIVE CONSTITUENTS OF DIGITALIS LEAVES AND SEED.

According to Kiliani (*Arch. der Pharm.*, **233**, 311) the leaves of digitalis contain neither the so-called *Digitalin verum* or digitonin, while Keller (Über die Wertbestimmung von Drogen und galenischen preparaten. Diss. Zürich, 1897) states that *digitalin* and *digitonin* are present. M. Cloetta has gone into this knotty problem, and finds that the leaves as well as the seed contain *digitonin*, *digitalin*, *digitoxin* and *coloring matter common to both*. He has not been able to establish the presence of *digitalein* in the leaves. The seed contains much more *digitalin* than *digitoxin*, while in the leaves the reverse is the case.—1898, *Arch. exp. Pathol. u. Pharm.*, **41**, 421.

L. F. KEBLER.

ON THE VOLUMETRIC ESTIMATION OF VANILLIN, BY WELMANS.

The method is based on the well-known property of vanillin as a phenol, to form salts with one equivalent of base. The method is as follows: into a 200 c.c. glass-stoppered flask place 1 gramme of vanillin, add 25 c.c. of alcohol and 25 c.c. of semi-normal alcoholic potash, and two or three drops of phenol-phthalein solution. Insert stopple, shake until complete solution results. Then retitrate the excess of alkali by means of a semi-normal hydrochloric acid solution. The normal factor of vanillin is 0.156.—*Pharm. Ztg.*, 1898, No. 71, 434.

L. F. K.

EDITORIAL.

NATURAL AND ARTIFICIAL RUBBER.

Of all the plant constituents there are none of such great economic importance as those that constitute what is called rubber. This is the product contained in the milk vessels of the plants of a number of natural orders, viz.: Euphorbiaceæ, Apocynaceæ, Asclepiadaceæ, Urticaceæ, Lobeliaceæ and Compositæ. These milk vessels were, according to Otto Chimani, first observed by Theophrastus and M. Lister and first anatomically studied by Malpighi. A large number of species yield the commercial rubber and new sources of the article are being described from time to time in the *Kew Bulletin*, see this JOURNAL, April, 1876, and *Notizblatt des Königl. Bot. Gart. u. Mus. Zu Berlin*. According to *Consular Reports*, May, 1898, p. 72, the imports of rubber into the United States during the fiscal year 1897, were : Rubber, free of duty, 35,574,449 pounds, valued at \$17,457,976 ; rubber, dutiable, \$297,953 ; old scrap and refuse for manufacture, 3,653,945 pounds, valued at \$113,722.

The U.S. Pharmacopœia recognizes the product of various species of *Hevea*, which is known as Para rubber. The State of Para does not produce (*Ibid.*, January, 1899) more than two-thirds of the rubber shipped through this port, the balance coming from the States of the Amazon as well as from Peru, Bolivia, etc. There entered the port of Para during the fiscal year 1897-98, 22,257 tons of rubber, and of this amount 11,422 tons were shipped to the United States and 10,796 to Europe.

The principal bearing areas in the State of Pará are : The islands in the river Amazon, near the city ; the banks of the river Tocantins ; the banks of the rivers Xingu, Jary and Tapajos. The upper and lower districts of the Amazon produce the same kind of rubber, but that coming from the upper rivers obtains a slightly higher price, being dryer by the time it reaches the port of shipment.

It appears that the rubber-producing area in this Amazon section, recently discovered and untouched, is hundreds of times larger than that worked heretofore.

Some of the South American countries are seriously giving attention to the cultivation of rubber. Ecuador produces, it is said, every known species of rubber tree in great abundance from the *Ficus dolairia* in the vulgate *Ragasron* to the *Urceola*, the most beautiful of all ; the same can be said of Columbia. In these two countries the cultivation of rubber is a new industry. Hitherto, rubber has been obtained from wild trees, but the ruthless destruction of the plants by the greedy rubber seekers, who do not hesitate to cut them down to obtain a trifle more gum, has played havoc with the trade of this coast. In the remote regions of Ecuador, there are still large forests, but inefficient transportation increases the cost. An effort is being made to obtain from the Government an eight-year concession for the exploitation of rubber and quinine in a territory covering from eight to ten square leagues in the Province of Tungurahua.

Maniçoba rubber from Ceara, Rio Grande and Parahyba, States in Northern Brazil, ranks in price second to the Seringueira or Para rubber and is preferred even in certain classes of work to the latter. The interest in the growth of the plant yielding this rubber is steadily increasing, not only in the three States mentioned, but is also extending rapidly throughout Pernambuco, Alagoas and

Bahia, as it seems to give better results with less labor than almost any other agricultural product. The way the greater part of the Maniçoba rubber is produced is to simply cut the bark of the tree, letting the sap run in drops to the base, where by the action of the sun's rays it coagulates and forms an irregular solid mass, which is gathered by the natives and sold to middlemen, by whom it is shipped to America and Europe.

Mangabeira rubber is produced in the States yielding Maniçoba rubber and Sao Paulo. The rubber appears to be an inferior grade, and is used for covering cables, etc. During the past six months (ending December, 1898) several consignments of Mangabeira rubber arrived in Santos from the interior, and were quietly shipped to Europe. Formerly Mangabeira rubber brought only about half as much as that of Para, but the price has risen. It is said to be much harder and therefore preferable for certain purposes.

Florida rubber is a product that cannot be thought of for some time. It is true that the climate is admirably adapted for the cultivation of this tree, as suggested in Consular Reports, May, 1898. The writer also mentions that the camphor tree may also be grown here. While it has been demonstrated that the trees may be grown in Florida, the greatest item for consideration in this connection is the price of labor. So long as laborers, who might collect these products are paid the relatively high wages they receive, the cultivation of these plants for their products cannot be looked upon in this country as being a financial success that is within immediate reach. In this country as well as elsewhere various attempts have been made to manufacture rubber artificially. A patent was taken out some time ago in Germany for making an imitation hard rubber out of sawdust. Another process for making substances resembling rubber was to treat fixed oils mixed with tar or similar distillate products with nitric acid. By interacting between various proportions of nitro-cellulose and bromo-nitro-toluol or nitro-cumol and its homologues a material resembling rubber, it is said, may be obtained. Upon mixing a glue paste with tungstate of soda the precipitate is said to form an elastic mass under certain conditions. The latest artificial product is a corn rubber which is obtained, according to *Chicago Times* through *Journal Franklin Institute*, 1899, p. 251, from the refuse materials of the glucose factories. The following details will be of interest:

"Corn rubber has almost exactly the appearance of the ordinary reddish brown india-rubber. The process of manufacturing is not perfect enough, however, to make it resist heat as well as india-rubber. This has offered the greatest difficulties to the chemists, who are now working to remedy this defect. The oil of corn, from which principally the rubber is made by some secret process, does not oxidize readily, and those who are working on the corn rubber declare this will be an enormous advantage for the new product. Articles manufactured from it will always remain pliable and not crack. Contrary to reports, this new product has not yet been put on the market. It is intended to go on with its experiments till the success of the new substance is assured, and then to go into its manufacture on an immense scale.

"The corn-oil from which the rubber is made, comes from the germ of the corn and not from the hull. The starchy and glutinous portions of the kernel are used in making glucose and starch, while the corn-oil, heretofore, according to the refiners, has been practically useless. The five refineries of the trust have used 21,000,000 bushels of corn in the last ten months, of which

about 5 per cent. was refuse. Though forty different products are made by the company, still 5 per cent. was practically waste. By utilizing this waste material in making the new product it is calculated that corn rubber can be sold at 6 cents a pound, 2 cents of which will be clear profit. The corn rubber, it is said, will be adapted to nearly all the uses that ordinary rubber is capable of—from bicycle tires to linoleum. The more refined uses to which the rubber is put, however, will still be a closed field, for the composition of corn rubber will prevent its substitution for india-rubber for scientific uses."

It is further stated that the new product may be advantageously mixed with Para rubber, producing a cheaper article of substantially the same quality for ordinary service, as the genuine rubber.

The manifold uses to which rubber may be applied lead us to believe that we are likely to hear of the discovery of new plants yielding this product, the cultivation of the most important species and many attempts in the manufacture of an artificial product.

REVIEWS AND BIBLIOGRAPHICAL NOTICES.

HAND-BOOK OF PRACTICAL ASSAYING OF DRUGS AND GALENICALS. A Manual for the Pharmaceutical Student and a Guide to the Practical Pharmacist who has Occasion either to Standardize his own Preparations or to Test the Drugs and Galenicals he Dispenses. By A. B. Lyons., F.C.S. Detroit: Nelson, Baker & Co., Publishers. 1899.

This volume, of almost 250 pages represents all of the progress made in pharmaceutical assaying, since the publication of Lyon's Manual of Assaying, in 1886, and will be found a valuable addition to all pharmaceutical libraries since the original publications of assay processes are widely scattered in home and foreign periodicals.

Some eighty pages are devoted to descriptions of apparatus, reagents, selection and preparation of samples, methods of extracting the drug, methods of assay for drugs by various gravimetric and volumetric processes, and methods for assaying galenicals as extracts, fluid extracts, tinctures, wines and syrups.

The greater portion of the book then takes up forty drugs in detail, for which assay processes have been devised by the author and others; these drugs are generally treated according to the following system: Active constituents, methods of assay (gravimetric and volumetric—and in some cases also physiological; in case of the strychnos, opium and cinchona alkaloids methods for separating the alkaloids are also given), the assay of galenical preparations, and lastly, a statement as to the quantity of the active constituents found by assay.

The following criticisms are made to increase the value of this volume: In the preparation of reagents it would be far preferable to indicate percentage strength in place of some of the terms used—as hydrochloric acid (*B. P.*), *concentrated* ether, etc.; such statements would be valuable for all time, whereas pharmacopoeial strength and commercial names are liable to change.

On page 41 the statement is made "that the methods of Schwickerath, Keller and Kebler are modifications of, and in some respects improvements upon, those originally worked out by the author, following the general plan of

Prolli's short method for the assay of cinchona bark ;" on page 30, in commenting particularly upon Keller's method there is stated that all processes in which ether or even compound solvents are used, and in which an aliquot portion of the solvent is taken to complete the assay, "it may be expected that the *result of the assay will be high.*" The distinctively characteristic feature of Keller's method in the assay of crude drugs is the addition of water to cause the lumping together of the powder drug thus enabling the solvent to be poured off clear, and this feature has been adopted in the present volume. This addition of water was undoubtedly the main factor, causing *low results* in some assays of belladonna leaves recently made by the writer (AM. JOUR. PHARM. 1899, 105).

In processes in which an aliquot portion of the solvent is used, the quantity of drug represented by this portion should *always* be stated; this has been omitted in some cases, and is somewhat puzzling, as one then does not know whether the particular process makes allowance for extractive.

In giving the percentages of active constituents in the various drugs, it would be of great value to state by what assay processes these results were obtained; this could only be exceeded in value by incorporating comparative assays of the same drug by the various methods.

An additional word or two occasionally would be of considerable help in understanding a process; this is particularly the case when a drug is to be treated with a solvent which has for its object the removing of some interfering substance before proceeding with the assay proper. For example, Hager's method of estimating aloes in mixtures, page 100, would be better understood if the statement were made that the first extraction with the absolute alcohol, chloroform and benzol mixture removes other resinous substances (jalap resin in particular), and that the portion *insoluble* in this mixed solvent is to be extracted with alcohol.

The exact details of official assay processes are only given under cinchona; under opium the reader is referred to the original publication by Dr. Squibb in the ephemeris, while under nux vomica no mention of any kind is made of the official process; it seems to the writer that these processes should be given prominence in the book, particularly as the assay processes of the U.S.P., 1880, for cinchona and opium have been accorded space.

Under opium, page 206, in referring to the correction for impurities in the crude morphine, the lime water and ash methods are mentioned; in the latter the statement is misleading, the factor usually employed for calculating ash to calcium meconate (?), the supposed morphine impurity, being omitted.

The method of E. Dieterich adopted by the German Pharmacopœia is his original process; no mention is made of the improvement of the process by substituting acetic ether for ether.

On page 213 (401) the quantity of tincture of opium used, 160 c.c., should be 150 c.c. to agree with the process to which reference is made.

On page 214 (402) in the processes for assay of extract of opium, the quantities used do not accord with those in the cross-references; in these cases particularly the quantity of drug represented by the aliquot portion taken should be stated.

The following typographical errors were noticed in a careful perusal of the work, and should be added to the published list:

Page 37, line 11 from top, read 100 grammes.
Page 109, line 3 from bottom, read alkaloids.
Page 147, line 8 from bottom, read alternative.
Page 155, line 4 from top, read segregates.
Page 190, line 8 from bottom, read fluid.
Page 208, line 15 from top, read 51.5 c.c. instead of 15.5 c.c.
Page 214, line 5 from top read (384) instead of (348).

FRANK X. MOERK.

THE PHARMACEUTICAL FORMULARY. A Synopsis of the British, French, German and United States Pharmacopœias and of the Chief Unofficial Formularies, Being the Twelfth Edition of Beasley's Pocket Formulary. Edited by J. Oldham Braithwaite. London: J. and A. Churchill. Philadelphia: P. Blakiston's Son & Co.

This very convenient synopsis comes to us in a very much improved form. The first impression which strikes the reader favorably is the black type used for the titles, enabling the busy pharmacist to find quickly the preparation sought for. A judicious pruning has reduced the number of pages from 517 in the old edition to 464 in the new. A change in the label will be noticed by those who are familiar with the work; the old title, Pocket Formulary, Beasley, being changed to Beasley's Formulary—Braithwaite. The work has been carefully edited, and will be a valuable addition to the pharmacist's library and dispensing counter.

J. P. R.

THE COMING AGE. A Magazine of Constructive Thought. The Coming Age Company, Copley Square, Boston, and the Midland Publishing Company, St. Louis. Subscription, \$2 per annum.

Prof. J. U. Lloyd, whose entrance into the field of general literature, was so successfully marked by the appearance of "Etidorhpa," a lengthy review of which appeared in the November, 1895, issue of this JOURNAL, has become a contributor to the *Coming Age*, and his first paper under the caption "Do Physicians and Pharmacists Live on the Misfortunes of Humanity?" will appear in the April issue. This question has no doubt occurred many times to the minds of physicians and pharmacists alike, and we are especially glad that it has been taken up by Professor Lloyd for treatment.

The *Coming Age* is a new monthly magazine which makes its entrance amid modern literature, with the advent of the year 1899. The title of the magazine is quite indicative of its character, and while being, to a certain extent, ethical in its tendencies, deals with questions of general interest, and such as are in the line of modern progressive thought.

INDEX CATALOGUE OF THE LIBRARY OF THE SURGEON-GENERAL'S OFFICE OF THE U. S. ARMY. Second Series, Vol. III. C-CZYGAN.

This volume includes 11,112 author titles, representing 4,873 volumes and 10,630 pamphlets. It also contains 10,636 subject titles of separate books and pamphlets, and 34,314 titles of articles in periodicals.

MASSACHUSETTS BOARD OF REGISTRATION IN PHARMACY. Thirteenth Annual Report for the Year 1898. Boston.

In the Report it is emphasized that there is an advance in "the requirements of the pharmacist on the lines of analysis, microscopy and application of reme-

dies to disease, resulting in the drug store of the future becoming one of the most helpful, economic, time-saving and reliable aids to modern progress." On another page are submitted "some of the answers received, clearly exhibiting the need of great care in granting certificates of registration in pharmacy in this Commonwealth." These answers used to appear ludicrous, but we are inclined to look upon this matter more seriously, and wonder what is the use of making an advance in requirements of candidates, when their answers are as bad as they were thirteen years ago. Surely this indicates that applicants for apprenticeship ought to be examined first and the proficient only receive certificates indicating that they have the mental calibre for learning the drug business. When this board and other boards begin at the foundation, then they will not receive the astounding answers, and an advance in requirements will accomplish all that is claimed.

PENNSYLVANIA PHARMACEUTICAL ASSOCIATION.

The problem of framing practical laws for regulating the sale of poisons is doubtless one of the most difficult that our legislators encounter.

Too frequently the ethics of the question causes the production of a theoretical rather than a practical measure, with the result that no good is accomplished.

The Committee on Legislation of the Pennsylvania Pharmaceutical Association, of which Wm. L. Cliffe is Chairman, has proposed a rational and intelligent amendment to the proposed Senate Bill No. 18. This amended bill will accomplish what is practically desired for the protection of the profession involved as well as the public. The position of the Philadelphia Association of Retail Druggists on the measure originally introduced is seen in the resolutions passed at its last meeting and which are given in another part of this JOURNAL. The following is a copy of the bill as amended by the Legislative Committee of the Pennsylvania Pharmaceutical Association:

FILE OF THE HOUSE OF REPRESENTATIVES.

No. 153.

Session of 1899.

As amended by the Legislative Committee of the Pennsylvania Pharmaceutical Association.

AN ACT

To regulate the sale and use of opium, morphine, codeine, cocaine and their various salts or chloral, and to prevent the injurious use of same.

SECTION 1. Be it enacted by the Senate and House of Representatives of the Commonwealth of Pennsylvania in General Assembly met and is hereby enacted by the authority of the same that any registered druggist or apothecary, or any manufacturer of opium, morphine, codeine, cocaine or their various salts or chloral may sell the same to any registered druggist or apothecary, or to any legally qualified and authorized practitioner of medicine, surgery or obstetrics, human, dental or veterinary. Any druggist or apothecary may sell or deliver to any person other than such practitioner such opium, morphine, codeine, cocaine or their various salts or chloral upon and only upon first receiving an order or prescription for the same, signed by any such practitioner, stating clearly what quantity or quantities, and at what time or times the same shall be sold or delivered and the person for whose use the same is ordered or

prescribed, and such sale and delivery shall be in strict compliance with such order or prescription, which shall be retained by such druggist or apothecary and by him safely kept. But no such order or prescription shall be honored by any druggist or apothecary longer than one week after it bears date and shall be only filled once. Any practitioner of medicine, surgery or obstetrics legally authorized to practice as aforesaid, may sell or administer to or prescribe for any person such opium, morphine, codeine, cocaine or their various salts or chloral when, and as and only when and as in his judgment actually conducive to such person's physical welfare, but all prescriptions or orders which he shall issue for procuring the same from a druggist or apothecary shall bear the date on which the same shall be by him signed. Any person may administer to himself or others any opium, morphine, codeine, cocaine or their various salts, or chloral under and subject to and in accordance with the order and directions of any such practitioner of medicine, surgery or obstetrics, but not otherwise.

SEC. 2. No person except as above set forth shall sell, give away, deliver or cause to be sold, given away or delivered to any one or administer or cause to be administered to himself or any other person, or use or cause to be used in any manner any opium, morphine, codeine, cocaine or their various salts or chloral; and any person so doing and any person violating any of the provisions or requirements of this act shall be deemed guilty of a misdemeanor, and upon conviction shall be sentenced to pay a fine not exceeding \$500 and undergo an imprisonment not exceeding one year or either or both in the discretion of the court.

PHILADELPHIA ASSOCIATION OF RETAIL DRUGGISTS.

More than usual interest was taken in our meeting of March 3d, a larger number being present than at any previous meeting. The bond of Treasurer E. R. Smiley for \$1,000 was approved, and the West Philadelphia Title and Trust Company named as the bank for depositing the funds of the Association.

Mr. W. L. Cliffe called the attention of the Association to a bill which had been presented at Harrisburg relating to the sale of opium preparations, etc. President McIntyre appointed Messrs. Cliffe, Finnerty and Swain to act as a committee, and draft a set of resolutions protesting against the passage of such an act, as it would be against the interest of every retail druggist in the State of Pennsylvania, as they would require a prescription for every sale of pargoric and similar preparations.

President McIntyre has taken the resolutions to Harrisburg, to place in the hands of the chairman of the committee which has the obnoxious bill in charge. The following is a copy of resolutions protesting against passage of Senate Bill No. 118:

PHILADELPHIA, March 3, 1899.

To the Honorable, the Committee on Public Health and Sanitation of the General Assembly of the Commonwealth of Pennsylvania:

WHEREAS, A bill (No. 118, Senate file) has been introduced, designed for the purpose of regulating the sale of opium and cocaine, and preventing the inju-

rious use of the same, which bill is so broad in its provisions as to include all harmless remedies for domestic practice containing these drugs; therefore, it is

Resolved, That we, the Philadelphia Association of Retail Druggists, do hereby place on record our unqualified approval of any practical plan for the accomplishment of the purpose for which Senate Bill No. 118 is designed, yet we do respectfully protest against it as at present constructed, as being too sweeping in its restrictions, inasmuch as it would prevent the sale of harmless domestic remedies which are in proper public use all over the civilized world, and recognized by all nations having a pharmacopœia or other accepted standard formulæ.

Resolved, Further, that inasmuch as the Legislative Committee of the Pennsylvania Pharmaceutical Association is engaged in preparation of a bill for submission to the General Assembly regulating the sale of narcotic and other poisons, which bill will be ready for presentation to your honorable body shortly, we do respectfully ask your indulgence and pray that action on the pending bill may be suspended and a hearing vouchsafed by your honorable body to the said Committee of the Pennsylvania Pharmaceutical Association, with proper consideration of the bill proposed by them.

And we will ever pray, etc.

PHILADELPHIA ASSOCIATION OF RETAIL DRUGGISTS.

[Signed]

WM. M. MCINTYRE, *President*.

W. A. RUMSEY, *Secretary*.

A prospectus has been given to each member of the Executive Committee, together with the names and addresses of all druggists who are not members of the Association. The druggists will be called on, and it is hoped that they will take an interest in the Association, and become members of the same.

The next meeting will be held in the museum of the Philadelphia College of Pharmacy, Friday, April 7th, at 3 P.M.

W. A. RUMSEY, *Secretary*.

THE PHILADELPHIA COLLEGE OF PHARMACY.

ANNUAL COMMENCEMENT.

The Annual Commencement of the Philadelphia College of Pharmacy, for 1899, will be held at the Academy of Music, Broad and Locust Streets, on Wednesday evening, April 19, 1899, at 8 P.M. Tickets may be had of the Actuary, Thomas S. Wiegand, 145 North Tenth Street.

ANNUAL MEETING OF ALUMNI ASSOCIATION.

The thirty-fifth Annual Meeting of the Alumni Association of the Philadelphia College of Pharmacy will be held in Alumni Hall, at 145 North Tenth Street, Philadelphia, on Monday afternoon, April 17, 1899, at 2 P.M.

The President of the Association, Jas. C. Perry, '91, will deliver the annual address. The Secretary, Treasurer and Finance Committee will submit their annual reports, and the annual election of officers will take place.

Members are requested to be present, or, if unable to do so, to notify the Secretary, Wm. E. Krewson.

ANNUAL RECEPTION OF ALUMNI ASSOCIATION.

The Annual Reception of the Alumni Association of the Philadelphia College of Pharmacy, to the Graduating Class of 1899, will be held in the College Building, 145 North Tenth Street, on Monday evening, April 17, 1899, at 8 P.M.

The following programme will be rendered :

Address to the graduating class by Mahlon N. Kline, of Philadelphia.

Presentation of Gold, Silver and Bronze Medals, and Prize Certificates.

Annual Class Oration, by Wm. Allen Chamberlain, of Indianapolis, Ind.

Class Poem, by Robert John Hoagland, of Peoria, Ill.

Class History, by Arthur Bowles Fleming, of Chambersburg, Pa.

Class Prophecy, by Christopher Koch, Jr., of Philadelphia.

EXAMINATIONS.

The following is a copy of the questions given to the first and second year classes at their recent examination. Those in operative pharmacy, analytical chemistry, botany and pharmacognosy were practical, and conducted in the respective laboratories ; the others were written :

FIRST YEAR EXAMINATION.

THEORY AND PRACTICE OF PHARMACY.

A—(1) Describe the difference in the process, appearance and method of use between a granulated salt and a granulated effervescent salt. (2) Define Exsiccation. (3) State the objects of the process. (4) Define Digestion, Expression and Maceration. (5) Describe Repercolation.

B—(1) What are medicated wines? (2) What are the objections to the use of wine as a menstruum? (3) Describe a liquid which possesses all of the advantages of wine as a menstruum and none of its disadvantages. (4) Define Extracts and state their uses. (5) Are they uniform in quality as found in commerce?

CHEMISTRY.

C—(1) Describe the element Sulphur in its several physical modifications and its commercial forms. (2) Describe the several oxides of sulphur and state how each may be formed. (3) Give an example of an official sulphite, sulphate and thiosulphate, using the chemical formula in each case.

D—(1) Write a reaction for the production of Hydrogen Dioxide. (2) What are the characters and uses of Hydrogen Dioxide, and what tests will show its presence? (3) What is the common name of Hydrogen Nitride and how is it formed? Give tests for its recognition.

MATERIA MEDICA (PHYSIOLOGY).

E—Digestion.—(1) Name the seven stages of digestion. (2) Name the digestive ferments present in saliva, gastric juice and pancreatic juice, and state the kind of food upon which each of them acts. *The Blood.*—(3) State the color of arterial blood and venous blood and the side of the heart in which each is found. (4) In what three kinds of vessels does the blood circulate, and in which of these is nutriment yielded to the tissues? *Animal Heat.*—(5) What

is the normal temperature of the body, and what is the daily variation? At what time in the twenty-four hours is it lowest and highest? *Respiration*.—(6) What is the object of respiration and what are the number of respirations per minute? (7) What change is produced in the air by respiration? How many cubic feet of pure air does each person need hourly?

BOTANY.

F—(1) How would you distinguish between a dicotyledonous root and a dicotyledonous rhizome? Give a drug example of each. (2) How would you determine if an herb or leaf drug has been properly dried and preserved? (3) By what means is pollination in the flowers of *Vanilla* effected? (4) What terms are used to distinguish such fruits as *Cardamom*, *Colocynthis*, *Illicium* and *Cubeb*? (5) Mention and describe a drug flower that possesses an inferior ovary; also an official fruit that has a superior ovary. (6) State briefly the characteristics of the flowers of the *N. O. Compositæ* and mention three drug samples. (7) What is *Lupulin*? (8) What is the difference between an albuminous and an ex-albuminous seed? Give a drug example of each. (9) What is *Mace*? (10) State briefly how you would proceed to determine whether a lot of ground black pepper is pure?

COMMITTEE.

G—(1) Give the chemical formula of so-called Carbonic Acid. (2) Describe its physical properties. (3) What effect has the gas upon the system when inhaled in large quantities? (4) In what form is it often taken into the stomach? (5) Give a process for preparing it in this form for internal administration.

H—(1) In a percolation experiment how may the end of the process be determined? (2) Explain the advantages of previous maceration in percolation. (3) How would you select the menstruum for percolating a drug, if you were compelled to originate a formula for a tincture of the drug? (4) How would you control the rate of flow of the percolate?

I—(1) Write the chemical formulas of Hydrogen Oxide, Nitrogen Tetroxide, Hydrogen Sulphite, Sodium Sulphate and Calcium Oxide. Describe official Sulphuric Acid and give briefly its process of manufacture.

K—(1) A retail druggist buys the following goods: $\frac{1}{2}$ dozen Expectorant at \$8.00, $1\frac{5}{8}$ dozen Lithia Tablets at \$3 50, $\frac{1}{2}$ dozen Worm Syrup at \$1.75, $4\frac{7}{8}$ gallons Alcohol at \$2.60 and $2\frac{1}{4}$ pounds Subnitrate of Bismuth at \$1.50; make a bill in correct form for the above, carrying out the amount of each item and give the total. (2) What would a profit of 50 per cent. on this bill yield him? (3) State what additional profit would be yielded if the retail druggist received a discount of 2 per cent. for cash.

OPERATIVE PHARMACY.

(2) *Granulated Salt*.

Acetic Acid	20 C. C.
Sodium Carbonate	20 C. C.

Water of each, sufficient. Make Sodium Acetate. Put in the small wide-mouth bottle.

(1) *Specific Gravity.*

Determine the specific gravity of the liquid contained in the bottle labelled "specific gravity liquid;" put all calculations on the sheet of paper, with your name and examination number.

(3) *Solution of Ferric Sulphate.*

Ferrous Sulphate	52.8 gm.
Sulphuric Acid	6 c.c.
Nitric Acid	5.5 c.c.

Water sufficient to make 100 c.c. Make solution of Ferric Sulphate by the U. S. P. formula. Put in the 4-ounce bottle.

PRACTICAL BOTANY.

(1) Make sections of specimen No. 1 and determine whether a root or stem; monocotyledon or dicotyledon. Draw a diagram and indicate the tissues and their arrangement. Jamaica ginger. (2) What is the name of this drug? Make a drawing indicating the parts; also make a transverse section and indicate in a diagram the characteristic features. Fennel. (3) Purchased for powdered mustard. Determine its purity and state on what you base your determination. Adulterated with 25 per cent. of wheat middlings. (4) Determine the following crude drugs and powders. (a) Stramonii Semen; (b) Illium; (c) Chenopodium; (d) Arnicae Flores; (e) Anthemis; (f) Powdered Nux Vomica; (g) Maranta; (h) Lupulin; (i) Nux Vomica.

SECOND YEAR EXAMINATION.

THEORY AND PRACTICE OF PHARMACY.

A—Water.—(1) Under what official titles is Water designated in the U.S.P.? (2) How is the purity of official Water determined? (3) What metallic impurity is sometimes found in Water supplied to cities and towns? State the origin of such contamination. (4) Why is distilled Water directed in many official preparations? (5) By what simple test may "hard water" be recognized? (6) Is colorless, transparent, odorless Water always pure?

B—Sugar.—(1) Give the official name and definition of Sugar? (2) From what sources is it obtained? (3) Describe the best form of Sugar for making pharmaceutical syrups. (4) What impurities are found in Sugar? (5) Name the substance often added to Sugar to make it appear white. (6) What is Rock Candy? (7) How is it made? (8) What is Treacle? (9) If you were to get a prescription for Syrupus Fuscus, what would you use?

C—Ether.—(1) How is Ether made? (2) What are its uses in pharmacy? (3) State its medical properties. (4) What is the specific gravity of official Ether? (5) Is its vapor heavier or lighter than air? (6) How do you recover Ether from percolates in making oleoresins? (7) State what advantages Chloroform has over Ether for pharmaceutical purposes.

D—Glycerin.—(1) How is Glycerin made? (2) What are its uses in pharmacy? (3) What are its uses in the arts? (4) State its official specific gravity. (5) What is its specific volume? (6) How many fluid ounces are there in an avoirdupois pound of official Glycerin?

E—Benzin.—(1) Give the official definition of Benzin. (2) What are its uses in pharmacy? (3) What is its specific gravity? (4) How does it differ from Benzol? (5) How is Benzol made? (6) What precautions are necessary in using Benzin?

CHEMISTRY.

F—(1) State how Aluminum occurs in nature. (2) Describe the metal and mention the processes for its preparation. (3) Give the formula for Alumen Hydras, for Alumen, for Alumen Exsiccatum. (4) Describe the appearance of each of these.

G—(1) What is "White Arsenic?" Describe it and give the chemical formula. (2) Enumerate the most important tests for arsenical poisoning. (3) Give the exact chemical name and formula for Sodii Arsenas.

H—(1) Mention the most important ores of iron, stating their chemical composition. (2) Describe the several varieties of manufactured Iron, noting their physical and chemical differences. (3) Give the formulas of Ferri Oxidum Hydratum, of Ferri Sulphas and of Ferri et Ammonii Sulphas.

J—(1) What are the sources in nature of Phosphorus and Phosphoric Acid? (2) What is a Superphosphate? Give the reaction for the production of Superphosphate of Lime. (3) What is meant by "Reverted Phosphoric Acid" in a fertilizer?

K—(1) What is the difference between Mortar and Cement? (2) Give the chemical formula of Gypsum and state what products are made from it. (3) What is the chemical composition of pure Clay? Mention some of the products made from Clays.

MATERIA MEDICA.

L—Jalap.—(1) Give the official name and botanical names, habitat and natural order of the plant. (2) Give a brief description of the drug and the way in which it is prepared for the market. (3) What is its chief constituent, and the requirements of the Pharmacopœia concerning it? (4) State the part of the body upon which Jalap acts, its medical properties and its dose. (5) Name the False Jalaps; which of these yields a resin identical with the resin of Scammony?

M—Compositæ.—(1) State briefly the botanical characters of its flowers. (2) Give the Latin and English names of the official flowers. (3) Which of these flowers yields a poisonous neutral principle? Give its dose and action. (4) State the medical properties of Oil of Erigeron and its color when efficient. (5) Name a root, a rhizome and an herb drug derived from this order.

N—Cayenne Pepper.—(1) Give its official and botanical names, natural order and habitat. (2) Describe briefly the official part and state its principal constituent and the amount present. (3) What effect does this drug have upon digestion and the skin? (4) Name a liquid alkaloid yielded by the same order. (5) State the effects of the latter upon the heart and digestion when used to excess.

O—Alkaloids and Glucosides.—(1) *Solanaceæ.*—Give the botanical names of the plants yielding mydriatic alkaloids, and name three of these alkaloids. (2) *Rubiaceæ.*—Name an emetic and two febrifuge alkaloids and the plants from which they are derived. (3) Name the alkaloids present in Quaker Buttons, their doses and a chemical and physiological antidote. (4) *Calabar Bean.*—

Name the alkaloids derived from it, and state its effect upon the eye. (5) Name the alkaloids derived from Monkshood and state their effect upon the heart and circulation. (6) Name the glucosides present in Uva Ursi, Bittersweet, Liq-uorice Root, Willow Bark.

P—Umbelliferae.—(1) State briefly the botanical characters of the order. (2) What is the chief constituent yielded by most of the order, and in what part is it contained? (3) Name a poisonous alkaloid derived from a fruit of this order. (4) What Athenian philosopher was put to death by it, and what is its action upon the motor nerves? (5) Name two official gum resins derived from this order.

ANALYTICAL CHEMISTRY.

For the examination in qualitative inorganic analysis the class was divided into two sections. The candidates were first given a written examination on the branch. The questions were as follows:

FIRST SECTION.

A—Give the means of detecting HCN, HCl, HI and HBr when all are present in a solution of their salts.

B—How would you distinguish the salts of H_2SO_4 , $\text{H}_2\text{S}_2\text{O}_3$ and H_2SO_3 from each other?

C—(1) How would you test sulphuric acid for nitric acid? (2) How would you test nitric acid for chlorine?

D—(1) Name three salts which are soluble in water and whose aqueous solutions have alkaline reaction to litmus paper. (2) Name three salts which are soluble in water and whose aqueous solutions have acid reaction to litmus paper. (3) Name three salts which are soluble in water and whose aqueous solution are neutral to litmus paper.

E—Should pure hydrochloric acid leave a residue upon evaporation?

F—Describe the behavior of calcium during the analysis of a solution containing it and phosphoric acid for bases.

G—A certain official salt occurs in orange-yellow, crystalline pieces which are odorless, or nearly so, and soluble in water. The aqueous solution is acid to litmus paper, yields a brownish-red precipitate with NH_4OH , a blue one with $\text{K}_4\text{Fe}(\text{CN})_6$, and a white one insoluble in HNO_3 with AgNO_3 . What is the name of the salt?

SECOND SECTION.

A—A solution containing ammonium salts is to be tested for potassium salts. Tell how you would prepare the solution for the application of a reagent to precipitate the potassium. Name the reagent you would use and give its chemical formula.

B—Describe the chemical test by means of which you would distinguish between: (1) The official Chlorine Water and Hydrochloric Acid. (2) Sodium Bicarbonate and Sodium Borate.

C—(1) Name three Salts of Zinc which are soluble in water. (2) Name three Salts of Calcium which are insoluble in water.

D—How would you test Potassium Iodide for Chloride?

E—What compounds are formed upon mixing: (1) KOH and HgCl_2 . (2) NH_4OH and HgCl_2 . (3) $\text{Ca}(\text{OH})_2$ and Hg_2Cl_2 . (4) NH_4OH and Hg_2Cl_2 .

F—Name the different compounds into which Zinc enters in succession during the analysis of a solution containing a soluble salt of it.

G—A certain official salt forms heavy, colorless crystals or crystalline masses, which are odorless and soluble in water. The aqueous solution reddens blue litmus paper. With NH_4OH it yields a white precipitate; with an excess of H_2S a black one; with KI a red one, soluble in an excess of the reagent, and with AgNO_3 a white precipitate, insoluble in HNO_3 . What is the name of the salt?

In addition to answering the questions submitted to his section, each candidate was required to detect the bases and acids in a mixture of salts, some of which were soluble in water, and others insoluble in water.

Time allowed for written examination, one hour; for analysis, three hours.

SECOND YEAR EXAMINATION.

PHARMACOGNOSY.

(1) Give the Pharmacopœial names of all the crude drugs in the collection before you. A collection of about fifty crude drugs in small fragments. (2) Identify the following powders. State approximate degree of purity of each and on what you base your determinations. Draw any characteristic features. Stramonium seed, hyoscyamus leaves, red cinchona, compound licorice powder and powdered opium containing 25 per cent. "wheat middlings." (3) Determine the value of the specimen of *Strophanthus*. (4) What is contained in the sediment of the specimen of urine? Draw any characteristic features. An alkaline urine containing phosphates, ammonium urate and bacteria.

OFFICIAL LIST OF SPECIMENS FOR SECOND YEAR EXAMINATION.

(1) *Aqua Menthæ Piperitæ*. (2) *Tinctura Cardamomi Composita*. (3) *Linimentum Chloroformi*. (4) *Tinctura Aurantii Amari*. (5) *Pulvis Cretæ Compositus*. (6) *Sodii Bicarbas*. (7) *Ammonii Chloridum*. (8) *Potassii Nitras*. (9) *Magnesii Sulphas*. (10) *Acidum Sulphurosum*. (11) *Belladonnæ Radix*. (12) *Granatum*. (13) *Conium*. (14) *Aconitum*. (15) *Digitalis*.

MINUTES OF THE PHARMACEUTICAL MEETING.

PHILADELPHIA, March 21, 1899.

The regular monthly Pharmaceutical Meeting was held in the Museum of the College with George M. Beringer in the chair.

The meeting was very well attended, and, considering the number of papers presented together with the interest manifested in the discussions, was one of the most successful of the present series.

F. W. E. Stedem was the first speaker on the programme and read a paper containing useful suggestions for practical pharmacists, and having the title "Shorter Methods for the Preparation of Some Pharmacopœial Products." (See page 162.)

In discussing methods for the preparation of tincture of iodine, Mr. Wallace Procter alluded to a method which is simple and expeditious. It consists in placing a layer of absorbent cotton in the lower end of a test tube which has been perforated (or a small cylindrical funnel may be used), then introducing the

iodine and afterward adding another layer of cotton, the whole being then suspended in a vessel containing alcohol. The principle involved is that of circulatory displacement. The registrar, Mr. Wiegand, said he had used this method over twenty years ago with entire success.

In commenting on processes for the medicated waters the chairman, Mr. Beringer, favored solution of the medicating ingredient in either hot or cold water. Remarking further on this subject Mr. Stedem said that he never found any trituration method satisfactory. Dr. Lowe was inclined to the use of hot water for effecting solution of the oils. Professor Ryan said that it was strange that the Pharmacopœial Committee should adopt methods which were so impracticable as those directed for the medicated waters. He agreed with the chairman that these can be most readily prepared by simple solution in either hot or cold water.

A paper entitled "Japan Wax as a Substitute for Beeswax in the Official Ointments and Cerates," was presented by Robert C. Pursel, a student of the College, and will be published in full in a later issue of this JOURNAL. In summing up his observations the author found that Japan wax is a very good substitute for beeswax in nearly all of the official ointments and in all of the official cerates. The products made with Japan wax were slightly darker in color than those made with beeswax, but the difference was not sufficiently pronounced to be considered a serious objection. While the melting-point of Japan wax was found to be lower than that of beeswax, its composition appears to be firmer, and hence a less quantity is required to give a preparation the desired consistency. The main points, however, which were advanced in favor of Japan wax were those relating to its purity and cost as compared to beeswax. The results of the author's experiments showed that there is considerable difficulty in obtaining pure beeswax (one of its adulterants being Japan wax), while on the other hand pure Japan wax is readily obtainable at about one-fourth the price of beeswax.

After examining a sample of Japan wax which accompanied the paper, Professor Remington asked with a view to its future utility in pharmacy, whether this product can always be obtained of uniform quality. Mr. La Wall, in replying to this question, said that no less than 20,000 pounds had come under his notice, and that in only one case was it adulterated, the adulterant being starch. He said that on exposure it becomes slightly yellowish. Others taking part in this discussion were the chairman and Messrs. Stedem and Meyer.

"Some Further Observations on Extracts Made with Acetic Acid," was the subject of a communication by Wm. B. Thompson, which will be published in a subsequent issue of this JOURNAL. Samples of acetic extracts made by Messrs. E. R. Squibb & Sons, and corresponding alcoholic extracts made by Messrs. John Wyeth & Bro., were exhibited for purposes of comparison. While claiming that we must ultimately depend upon clinical experience to determine the value of medicines, the author admitted that certain assays and tests furnished reliable information in regard to the drugs to which they were applied, and that in this respect many of the acetic extracts merited our favorable consideration. He inclined to the belief, however, that the peculiar aroma or vinous odor which belongs to alcoholic extracts, particularly after having been kept for some time, entitled them to superior rank. In the case of the acetic extracts he thought that the odor of the acid menstruum prevailed, not only

masking the odor of the drug but being less agreeable than the odor developed in alcoholic extracts.

In discussing this subject, Professor Remington said that it was one in which he had long been interested and that his early views in regard to the use of acetic acid as a menstruum were incorporated in the first edition of his "Practice of Pharmacy." Continuing, he said that we have long been suffering under the enormous alcohol tax and that a remedy in the case of some preparations has been found in acetic acid. He did not claim that all of our alcoholic extracts could be replaced by acetic extracts, but was satisfied that many of them could be so replaced. In regard to the permanency of acetic extracts he remarked that he had samples in his cabinet which were fifty years old and still in good condition. In regard to the mellowing of the fluid extracts to which Mr. Thompson referred, Professor Remington said that fluid extracts were stored by manufacturers more to get rid of the precipitates than to develop aroma. He said that the acetic extracts also have an aroma, and referred in this connection to the development of ethyl acetate when alcohol and acetic acid are used together as a menstruum. The odor of the acetic ether is not present at first, but develops on standing. To illustrate this he alluded to the circumstance that Dr. Squibb introduced a compound solution of opium, the original menstruum being alcohol, water and a little acetic acid. The odor of ethyl acetate was developed by age and he found that physicians wanted the *old* compound solution of opium. He then changed the formula by adding ethyl acetate to the solution at once and leaving out the acetic acid. Professor Remington said that he was glad that Mr. Thompson brought up the subject of aroma, and that the question as a whole, was one meriting the careful consideration of pharmacists.

With regard to the name "Acetracts," he said that there should be some distinctive title to distinguish these preparations; the difference in cost is great and the temptation to substitute a fluid extract (made with acetic acid) for the official preparation difficult to resist; if a doctor orders a fluid extract he should get only the U.S.P. alcoholic preparation; if the doctor orders a fluid acetract he can only mean a fluid extract made with acetic acid.

Mr. J. W. England thought that clinical tests would be necessary to establish the efficiency of the acetic acid extracts. He referred in this connection to some of the incompatibilities which would be encountered as, for instance, the development of ethyl acetate in a prescription containing alcohol and an acetic extract, and also the chemical incompatibility of a prescription calling for acetic extract of *digitalis* and ammonium carbonate.

Others participating in the discussion of this paper were the chairman, Mr. Stedem, and Professors Ryan and Moerk.

Prof. C. B. Lowe presented a paper on "The United States and British Pharmacopœias," which embodied some interesting comparisons. One of the most important criticisms which he made was that in reference to the dissimilarity in strength of many corresponding preparations found in the two books, notable examples of this difference being furnished by the two classes, the tinctures and the acids.

The paper will appear in a later issue of this JOURNAL. Professors Remington, Ryan and Messrs. Beringer and Thompson took part in the discussion of this paper.

A valuable paper on "The Estimation of Nitrates and Ammonia in Water" was read by Prof. F. X. Moerk (see page 157).

Christopher Koch, Jr., presented a communication on "A Proximate Analysis of Yellow Pine Bark" (see page 164).

Professor Remington directed attention to a beautiful specimen of asbestos which was presented by Mr. Mattison, a student of the Collège. Professor Lowe exhibited samples of morphine and quinine, the former being in the form of small cubes, so as not to be mistaken for the latter. The samples of alkaloids represented products of the New York Quinine and Chemical Works.

On motion, the meeting adjourned.

THOMAS S. WIEGAND, *Registrar*.

OBITUARY.

WILHELM MERCK, the senior member of the chemical manufacturing house of E. Merck, died in Darmstadt, on January 12, 1899. He may be said to be one of the fathers of the chemical industry of Germany, and the following sketch was taken from *Merck's Market Report*:

"He was born in Darmstadt on October 11, 1833. His father, the Grand-ducal Superior Medicinal Councillor and Apothecary, Heinrich Emanuel Merck, was a great-grandson of Johann Heinrich Merck, known in literary history as a friend and critic of the poet Goethe; and he was a lineal descendant of Jacob Friedrich Merck, who in 1668 founded the Merck Pharmacy in Darmstadt, from which grew the present Merck Chemical Works. Wilhelm Merck's preparatory education was obtained in the humanistic and technologic high schools ("Gymnasium" and "Gewerbeschule") of his native town. His first introduction into the study of chemistry, which he had resolved to make the pursuit of his life, was given him by Remigius Fresenius. Later on, his steps in this science were guided by Loewig, at the University of Breslau. Thence, he was called back to Darmstadt by the death of his father, at that time the head of the Merck establishment. His scientific attainments, however, were not yet adequate to his ideal conception; and so he went abroad once more for the purpose of extending the scope of his knowledge. The celebrated chemist, A. W. Hofmann, was at that time teaching in London, and Wilhelm Merck remained several terms under his tuition; after which he spent one semester in Wurtz's laboratory in Paris; thereupon returning to Darmstadt, where he joined his elder brothers, Karl and Georg, in the conduct of the Merck house. After Georg Merck's death, in 1873, Wilhelm Merck assumed control of the laboratories, and works, while to his brother Karl fell the task of directing the commercial operations of the house. When Karl Merck died, in 1885, the surviving brother, Wilhelm, became the head of the house, the affairs of which he then continued to manage with the assistance of his nephews. The energy and wisdom with which he carried out this task is best demonstrated by the facts that the number of employees in the manufacturing establishment of E. Merck is at present nearly twenty-fold what it was when Wilhelm Merck entered into the administration of the house, in 1860; and that, during his continuance in the firm, it established the branch houses in New-York, London and Moscow. The New York branch, in 1889,

developed into the independent house of Merck & Co., in which the family name of the Darmstadt establishment is borne by a son of the deceased—George Merck. (The latter and Theodore Weicker, editor of *Merck's Report*, constitute the American firm.)

"Wilhelm Merck, besides his intensive labors in his chosen field of chemical industry, constantly devoted notable efforts—in the unassuming way characteristic with him—to the public affairs and welfare of the commonwealth in which he resided. He was, during a quarter of a century, a member of the Municipal Council and President of the Chamber of Commerce. In 1889, Wilhelm Merck's public merits were also formally recognized by his sovereign, who appointed him Privy-Councillor of Commerce and a life member of the First Chamber of the Estates of the Grand Duchy, a body analogous, in that commonwealth, to what in Great Britain is the House of Lords."

Hervey C. Parke, President of Parke, Davis & Co., died on February 8th. The following sketch we take from the *Bulletin of Pharmacy*:

"Beginning life with no other capital than a stout heart, a willing pair of hands and a good name, he ended it the head of a great institution known the world over. Mr. Parke was born the son of a physician in Bloomfield, Mich., and was educated at a private school in his native village. When 16 years old he attended the High School in Buffalo for one year, after which he entered the employ of an upholsterer in that city. Two years later his parents were both the victims of an epidemic, and he returned to his home. Here he taught school for a time, and then was successively a clerk in a hardware store, a clerk in a general store, the financial manager of a mining company and a dealer in mining hardware. Then was started, after these twenty-two years of business success and education, the institution which was to engage his future activities and which was to make his name known to every prescriber and dispenser of medicine in every country on the globe. Duffield, Parke & Co. were successful manufacturers of chemicals in Detroit for four years, when Mr. Duffield's interest was purchased and the firm became known as Parke, Davis & Co. From the small three-story building and the few employes of that time, the business has grown until now three entire city squares are covered with the laboratories of the firm, and over 1,200 employes are engaged in the manufacture of its products—until the services of 130 travelers, scattered throughout the world, are required—until large branch offices have become necessary in the main American cities and in foreign countries. No better monument to the memory of Mr. Parke could be builded than the house of Parke, Davis & Co.

"All through his life Mr. Parke was a liberal philanthropist. He regularly gave a large portion of his income to the support of the Church, and to many public and private charities he was a liberal contributor. Kindly in disposition, modest in demeanor and democratic in spirit, Mr. Parke was beloved by his family, his friends, his business associates and by all who knew him. The humblest employe, if personally known to him, received the same friendly nod of recognition accorded the heaviest stockholders of the corporation. When his death became known about the laboratory there was real sorrow in the heart of every employe who had known him personally, and almost every one could have been found at the funeral services a few days later."



THE AMERICAN JOURNAL OF PHARMACY

MAY, 1899.

✓ SYRUPUS PRUNI VIRGINIANÆ (ACETOUS).

BY JOSEPH P. REMINGTON.

Syrup of wild cherry has long been one of the favorite vehicles not only for the administration of active remedies, but on account of its agreeable taste; it is often used *per se* for allaying slight bronchial irritation. Pharmaceutically no great difficulty has ever been experienced in making a good syrup, but the presence of tannin in considerable quantity has created much difficulty in making a permanent fluid extract, which possesses all of the valuable constituents and a minimum of the undesirable principles. In the series of experiments undertaken to prove the value of acetic acid as a menstruum, fluid extract of wild cherry was made, and in the course of collateral investigations to show its miscibility with water, glycerin and syrup, the idea of using very dilute acetic acid for the infusion to be made into the syrup suggested itself, and the following formula is proposed:

	Metric.	Old Form.
Wild cherry, No. 20 powder	150 gm.	5 oz., av.
Sugar	700 gm.	25 oz., av.
Glycerin	150 c.c.	5 fl. oz.
Diluted acetic acid, U.S.P., sufficient to make	1,000 c.c.	34 fl. oz.

Moisten the wild cherry with 50 c.c. (or 1½ fluid ounces old form) of the diluted acetic acid, and macerate for twenty-four hours in a close glass or earthenware vessel, then pack it firmly in a cylindrical non-metallic percolator. Percolate the wild cherry with diluted acetic acid until 450 c.c. (or 15 fluid ounces old form) of liquid is obtained. In this dissolve the sugar by agitation without

the use of heat, strain, and pass enough diluted acetic acid through the strainer to make the product measure 1,000 c.c. (34 fluid ounces old form).

The quantity of acetic acid may be reduced if necessary by using for a menstruum, equal quantities of diluted acetic acid and water.

The syrup thus made is light reddish-brown in color, has the characteristic peach kernel flavor, with a decidedly agreeable, acidulous taste, with the astringency greatly modified. Hydrocyanic acid is present, the acetic acid not interfering with its generation. The glycerin, it will be observed, is not added to the menstruum, but is placed in the receiving vessel; this prevents the decomposition of the infusion, which rapidly occurs when a solely aqueous menstruum is used; in addition to this less tannin is found in the product, for, as is well known, glycerin is the best solvent for tannin.

AN INVESTIGATION INTO "HUSA," AN ASSERTED PLANT PREPARATION TO CURE THE OPIUM HABIT.¹

BY PROF. JOHN URI LLOYD.

In February, 1898, *The Texas Courier-Record of Medicine*, p. 195, in the leading article, under the head, "Practice of Medicine," published a paper by W. W. Winthrop, A.M., M.D., Fort Worth, Tex., titled, "Singular Discovery of a New Florida Plant, that is an Antidote for Snake Poison, and a Cure for the Opium and Morphine Habits."

This paper is not suitable for condensation, and is too long for reproduction.

In substance, the author states that in Florida he found a negro who had a secret antidote to poisonous reptile bites. This negro would allow two immense rattlesnakes to bite him with impunity. To use "Dr. Winthrop's" words, "These snakes he would irritate any number of times a day and allow to bite him on the hand, arm, breast or any place indicated. This I saw frequently and investigated. After each bite he would take a mouthful of some herbs which he carried in a little bag, he claiming that these herbs counteracted the effects of the bites, which they evidently did."

¹ Read at the joint meeting of the Cincinnati Section of the American Chemical Society and the Cincinnati Academy of Pharmacy, University of Cincinnati, March 15, 1899.

Naturally, the author endeavored to identify these "herbs," but the negro refused to divulge his secret. He then made the negro drunk and learned that, "Boss, de is viellies an' husen, an' I gets 'em from de Semmes in de dales," which the author interpreted as "Seminole Indians who live in the everglades." At once he started for the everglades, but found that "I could elicit nothing from the Indians, men or women." None would give up the valuable secret. Then came a friend in need in the form of a remarkable naturalist from Scotland who supplied the missing information, the event being chronicled as follows:

"Just as I was about to give up the matter in disgust I met a Dr. McGregor, a Scotchman, from the University of Aberdeen, Scotland, who has spent many years in Florida and along the Gulf coasts. He was gathering orchids and other plants for his university or museum. From him I learned all I wanted to know. 'Viellies an' huser,' as translated by him, means the spear-eared violet, *Viola sagittata*, 'huser' is husa, so-called by the Indians, sometimes hoosu; the whites call it yousa and yusee."

Proceeding, the author (Dr. Winthrop) informs us that "The *Viola sagittata* has long been known as possessing antidotal properties for snake poison. The eclectic school of medicine use it for many purposes. Husa, however, is not much known. It is an unclassified plant of a dirty whitish-green color, about 2 or 3 inches long. It has at its summit a ball-like white formation. Where the flower should be this is hard, slightly lobulated, and is to all appearances like a small cauliflower. It grows in clumps, in moist, shady places, particularly on the hammocks at the roots of the cabbage palms. It is of a low order of plants, above the mosses; it is, I believe, a cryptogam."

Thus it appears that this mixture of herbs that the negro used was (Winthrop) a mixture of two plants, one (*viola sagittata*) long, according to the author, known to eclectic medicine, the other (husa), *unclassified*. But, while the first of these was, according to the author, used by the eclectics in snake bite, etc., the second, *unknown to science*, was a remarkable cure for the morphine habit. This is asserted as follows: "From Dr. McGregor I learned that it is a perfect antidote for all snake bites, stings of insects, etc., also an antidote for narcotic poisons. It is the most diffusible

stimulant known, acting immediately. It is, owing to these two last-mentioned properties, that it has been found to be so efficient a remedy for the opium habit. I have tested it beyond question, and in every case, without one single exception, it is found to be a perfect cure. It takes the place of opium or morphine. Supporting the patient fully, it is sedative but not narcotic. It produces slight elation, but no somnolent effect. To use the illustration of one physician who cured himself of the opium habit with it, a habit of twenty-three years' standing, and using 40 grains sulph. morph. daily, 'It makes a man feel just as easy and comfortable as one feels after a satisfying meal.' As soon as I learned its properties, I sent some of the husa plant to several doctors I knew who used morphine; they one and all pronounced it 'a perfect success.' I have never known of a failure when the patient wanted to be cured. In the hands of a careful physician this remedy will be found efficient in the worst cases of drug addiction. * * * With husa, physicians can cure their patients addicted to the use of opium, morphine, etc., instead of letting them get into the hands of quacks."

The paper ends with the statement that "Any physician interested in this matter will find me willing at all times to give him all the information I possess on the subject."

Soon following this came a leading editorial in *The New York Medical Journal* (April 16th, p. 538, 1898), based on the foregoing paper from *The Texas-Courier Record*, in which the editor finally remarked that "It is to be hoped that the botanists will give us some information about 'Husa,' and that its medicinal virtues may be inquired into systematically." Succeeding this, *The New York Medical Journal*, June 25, 1898, gave place to a personal contribution from Dr. Winthrop, who added as follows:

"It has an acrid taste when chewed in a recent state. The tincture, according to its strength, is a diffusive stimulant, causing a gentle excitement to pervade the entire system, making one inclined to talk, laugh and 'have fun.' The active principle, husin, consists of white, very light flocculent, minute crystals which agglomerate into lumps when exposed to the air. It is poisonous as atropine or strychnine, $\frac{1}{40}$ of a grain causing violent beating of the heart, as though it would pump itself through the thorax. The blood rushes through the blood vessels with a resilient sweep that can be fol-

lowed; everything seems to sweep along in great undulating cycles. Nothing is stationary. One seems to get a view and a grasp of vast forces of nature sweeping, rushing, tumbling like billows or vast cloud masses from some immense power or force that seems to stand and judge. The person says to himself: 'It seems as though this was not new. I have seen all this before.' The mind seems to dominate all this. After this stage subsides, which it does slowly, then quiet and languor supervene; the skin is moist, and every muscle soft and relaxed, then comes a quiet sleep."

Following the conspicuity given "Husa" by such exceptionally responsible professional authorities as the above-named journals, came reproductions of the papers in full or in part, in various medical journals, together, even with editorial comments as well, this too, in the most reputable medical journals of America. From these commendations, the wonders of "Husa" spread into pharmaceutical print, and not a few of our own professional journals were inveigled into giving both Husa and its discoverer charming notices and excellent advertisements. At last the fame of Husa crept across the ocean, and now we find that our European friends are giving voice to the claims of the wonderful American discovery, a Florida plant, that is a specific for the opium habit.

Naturally, this conspicuity brought orders for Husa to dealers in American drugs and plant products. However, such a thing as "Husa" being unknown in trade, the Lloyd Library was asked to give its habitat and description. And lastly, since "Dr. Winthrop" used the name *eclectic* in connection with his wonderful discovery, it was natural that from the study I have made of eclectic medicines, I should be importuned, both by pharmacists and by physicians, for information on this subject. This accounts largely for the interest I exhibit in bringing "Husa" before this Society. I have before me a mass of correspondence on this subject, which I shall answer as follows:

In the first place, *Viola sagittata* is not used in eclectic medicine. It was introduced by Dr. John Fothergill, under the common name arrow-leaved violet, in 1775. It was first on record under its botanical name in Aiton, Hortus Kewensis, 1789, Vol. III, p. 287. It is not to be found in King's American Dispensatory, nor in Scudder, Webster, Watkins, Ellingwood, nor in any other authority of that school, and I have never known an eclectic physician to use

it. In the second place, the description "Dr. Winthrop" gives of the plant "Husa," corresponds somewhat to *Monotropa uniflora* (Indian pipe), a very well known plant (if it refers to any known plant), but as this "fit plant" is recommended in eclectic literature (see King's American Dispensatory, p. 606) as a substitute for opium, it could not be Husa, which Dr. Winthrop asserts is unknown and unclassified.² In the third place, I shall take exception to the professional form of the following statement, that "Dr. Winthrop" sends in circular letter to physicians who apply to him for "Husa." I have too much confidence in American naturalists to believe that any drug unknown to botanists is found and gathered by the boat-load by "two plume bird hunters." But I can best let the circular letter, to which I take exception, speak.

"As far as now known, Husa is found only in the everglades of Florida. This is a tropical wilderness. Vast stretches of stagnant tepid water, teeming with low forms of life, poisonous insects, mosquitoes, sand flies, tarantulas, centipedes, saurians of all kinds and poisonous serpents abound on every side. A dense jungle, matted vines, canes, saw grass, palms, strange fungi, rare orchids, a rich but little known flora. No roads, paths or trails—the compass the only guide, it is safe only for the experienced woodsman. Under such conditions it is extremely difficult to hire anyone to gather herbs in these glades, where, as they say, 'there is a snake under every bush.' No manufacturer has as yet been found to conquer these difficulties and give this remedy to the profession. I am entirely dependent for the little I get to two plume bird hunters, who hunt in the glades. I have to be satisfied with what they see fit to collect and charge what they please; it is this or nothing. Besides the above difficulties, there is no way of getting the herbs out of the glades, except in an open boat or skiff—then if the plants get wet or bruised or detained on the way, they are not fit to use. Sometimes a load costing \$25 has to be thrown away, not being fit for tincture or extract. Owing to these causes, it costs me from 25 cents to 40 cents an ounce in tincture, and at no time have I ever had as much as 10 gallons at one time. I have let physicians have it at about cost. Only physicians have had it from me. I have never had any for the laity at any price. All my knowledge of the plant and its uses have been derived exclusively from medical men."

² Mr. C. G. Lloyd states that *Monotropa uniflora* grows in abundance in sections of Florida where he has botanized.

It may interest the journalists who have, in my opinion, indiscreetly advertised "Husa" herb as a cure for the opium habit, to know that when "Dr. Winthrop" was written to by their professional readers, he refused to supply any herb whatever, returning the money, and writing to the following effect, which is the reply given one physician:

"Respectfully returned with reply, that I never send plants, it is impractical. They do not bear transportation well. I have to have extract made in Florida, and then diluted into three degrees of tincture for prescription. Plants would be of no use to you, or even crude extract. The action of Husa is peculiar—it is the most diffusible stimulant known."

But, as this experience (which agrees with all other attempts to get the drug) is enough to illustrate that "Husa" herb cannot be obtained for identification, I shall drop that phase of the matter and give the result of my researches concerning the preparation sold as "a tincture made from eight ounces of herbs to one pint of alcohol," but which was evidently graded up and down in the case. I will add that no difficulty whatever is experienced in getting this liquid; \$10 for thirty fluidounces, notwithstanding the rarity of the herb.

A responsible physician sent "Dr. Winthrop" \$10, receiving therefor a regulation supply which he used according to instructions, with a patient subject to the opium habit. At my request, he sent another \$10 and received another month's supply, which was sent to me unopened, with an affidavit to the effect that it had not been touched by him, simply addressed in the express office to me. On opening the box, I found ten 3-ounce vials numbered with printed labels from 1 to 10 successively. On each label was the physician's name, and the words *One Month* and the word *Poison*, nothing else; not even the famed name "Husa."

The letter accompanying the box contained a four-page circular, in which occurs the statement that "Husa is not narcotic." In addition, I take from this circular of "Directions" as follows:

"Stop at once your opiate, and under no circumstances take morphia, opium or any narcotic drug treatment, as ever so small a dose would interfere with your otherwise certain cure. Narcotics and Husa are physiological opposites, and even dangerous symptoms might ensue from taking them together. At no time during treatment will you feel like taking opiates; in fact, the remedy will

support you more satisfactorily without the heavy, deadening effects, and you will be better able to attend to your duties than while taking opiates.

"Sleep all you can. Undisturbed sleep, peaceful rest, is the best nerve tonic; in fact, the best medicine; avoid all prescriptions of proprietary medicine, etc., that might contain opium in some form.

"If these directions are strictly adhered to, if you totally abstain from opiates during treatment and otherwise properly take the remedy, you will be absolutely certain of an easy, permanent cure."

The vials contained liquids of one uniform brown-red color, such as burnt sugar imparts to water. Preliminary tests made on a specimen of Husa (No. 8), obtained previously, had demonstrated that its contents were: Morphine, approximately, 1.3 per cent.; salicylic acid, .16 per cent.; alcohol, 12 per cent.; glycerine, 10 per cent.; water, q. s., and coloring matter. The morphine was as sulphate. Systematic assays were then instituted with the ten vials to determine the morphine strength of the various liquids. The result is as follows:

Twenty-five c.c. of each liquid were evaporated to about 5 c.c. and then brought to the measure of 10 c.c. with water. To the product were added 3 c.c. of alcohol; 6 c.c. of ether and 1 c.c. of ammonia (10 per cent.). The mixture was shaken frequently until all the morphine was separated, when it was washed and weighed in the usual manner (U.S.P. process).

Result.—No. 1 contained 2.19 per cent. morphine; No. 2, 1.98 per cent. morphine; No. 3, 1.95 per cent. morphine; No. 4, 1.72 per cent. morphine; No. 5, 1.55 per cent. morphine; No. 6, 1.46 per cent. morphine; No. 7, 1.59 per cent. morphine; No. 8, 1.59 per cent. morphine; No. 9, 1.43 per cent. morphine; No. 10, 1.33 per cent. morphine.

Accompanying I exhibit in separate bottles, the morphine obtained labeled from 1 to 10 successively, also the sulphuric acid as barium sulphate and the glycerine and salicylic acid from the preliminary examination. It will be observed that the morphine is of a pure white, a condition quite different from morphine obtained from opium by the assay process, for then it has a yellowish color. The fact that it is so pure indicates, also, that it is *added morphine*, and that it is not in actual combination. The morphine obtained

conformed to all the reactions demanded by the United States Pharmacopœia, and, in addition, to the potassium iodate test, as well as Mayer's alkaloidal test.

To sum up, *Viola sagittata* is not an eclectic remedy, for the reason that the name does not occur in eclectic literature, and the drug is not employed by eclectics. "Husa" is said by "Dr. Winthrop" to be an undetermined plant (unknown to science), found by two plume bird hunters and gathered by them by the boat-load. My investigation of "Husa," as sold by its discoverer to his professional patrons, is to the effect that "Husa" is a liquid containing large amounts of sulphate of morphine, some salicylic acid, some alcohol, water, glycerine and coloring-matter, probably burnt sugar.

The discoverer of this wonderful antidote to the morphine habit asserts that a multitude of physicians are availing themselves of "Husa" as a substitute for morphine and opium in the treatment of victims addicted to the opium habit. This I believe fully, judging from the extensive advertising "Husa" has received by the grace of the editorial and reading columns of the American medical press, and judging from the high price charged for the morphine, I would fain believe that the term "victim" should not be restricted to the consumer of "Husa."

I would define "Husa" as follows: A solution of sulphate of morphine to be administered under the name "Husa," and only by physicians. It is sold to physicians at the rate of \$10 for about 234 grains of morphine. In support of this view, I offer the foregoing testimony and submit herewith the morphine obtained from 25 c.c. of each liquid. Until I am furnished with a new plant containing morphine to the extent found in these experiments, I shall accept that "Husa" is a concoction.

In conclusion, I take pleasure in extending thanks to Dr. Sigmond Waldbott for laboratory assistance, and to the physician who obtained for me the "Husa" preparation from "Dr. Winthrop."

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JAPAN WAX AS A SUBSTITUTE FOR BEESWAX IN THE OFFICIAL OINTMENTS AND CERATES.

BY ROBT. C. PURSEL.

With the progress of pharmacy, new products are being continually brought forward which may have new properties or which may be used to replace products already in use. On account of the

peculiar nature of the ointments, many efforts have been made to introduce products which would add to the permanency of their keeping qualities.

Of recent years Japan wax is an important article of commerce, and it was while examining a lot of several carloads some time ago that the thought occurred to me, why cannot it be used pharmaceutically?

My experience in examining Japan wax has been that in no case have I found any that was adulterated. A case of adulteration with starch was reported by La Wall (*AMER. JOUR. PHARM.*, November, 1896), but this can be so easily detected by the simple iodine test, that parties who seek for pecuniary gains by pursuing such methods have yet to discover an adulterant that is not easily detected, and at the same time cheaper than Japan wax, whereby they can successfully accomplish their purpose.

On the other hand, I have found beeswax to be very often adulterated. In some cases the amount of foreign matter is so small, that I am led to believe it is due to the careless manner in which it is prepared for market. The worst case of adulteration that I encountered was one which was labelled Pure Country Beeswax, and upon examination proved to contain about 25 per cent. of pure beeswax, the balance being paraffin and stearic acid. Recently another sample was examined which contained about 50 per cent. of tallow, having a melting-point of about 50° C.

Druggists not infrequently purchase their supply of beeswax from the producer, and not having the time and facilities for examining it as to its purity, make their ointments and cerates from the same, unconscious that probably they have been buying tallow, paraffin, etc., at an advanced price.

Another item in favor of Japan wax is its cost, it being worth about one-fourth as much as pure beeswax. This is of great importance to the average druggist, and one that should not be overlooked. Japan wax has a melting-point of about 53° C., but, notwithstanding this fact, it is more firm and less plastic than beeswax, hence a much less quantity is required to give an ointment or a cerate the desired consistence. In some cases I have found that 40 per cent. less Japan wax than beeswax can be used, and yet the product will have a consistence conforming to the U.S.P. requirements.

About a year ago I made a few of the official ointments that are

used the most, *i. e.*, simple ointment, oxide zinc ointment and ointment of rose-water, using Japan wax instead of beeswax, at the same time making the same ointments, respectively, according to the U.S.P.

Soon afterwards I made the six official cerates, using Japan wax instead of white wax, also making a sample of each, according to the U.S.P. This was done in both cases to compare their keeping qualities. They were stored in a cool place in the cellar, and were not disturbed, save a casual visit, for nearly one year. Recently they were taken out, and all were found to be in good condition except the cold cream and cantharides cerate; both samples of cold cream were slightly yellowish in color on the surface. The samples of cantharides cerate were covered with mould, which is liable to result if kept too long. As no druggist makes a sufficient stock of these cerates to last a year, these difficulties could be overcome by making fresh stock from time to time.

In making simple ointment with Japan wax the following formula was used:

Lard	85 grammes.
Japan Wax	15 "

This compared favorably with the U.S.P. product, both in appearance (save color) and consistence. As Japan wax is nearly colorless, the products wherein it is employed differ radically in color from those made by using yellow wax.

Benzoinated lard being used as the base in the oxide of zinc ointment, a sample was made in which the following proportions were used:

FORMULA NO. I.

Benzoinated Lard	97 grammes.
Japan Wax	3 "

This quantity of Japan wax proved to be sufficient to give the benzoinated lard the desired consistence during the warmest weather.

The oxide of zinc ointment was then made using benzoinated lard made with Japan wax, according to the following formula:

FORMULA NO. I.

Zinc Oxide	20 grammes.
Benzoinated Lard	80 "

This compared favorably with the U.S.P. product in all respects, no granulation was noticeable, but after standing about three months granulation did take place, as it did also in the U.S.P. product, although to a less extent.

A sample of oxide of zinc ointment was recently made according to the above formula. The benzoinated lard, however, being made according to the following formula:

FORMULA NO. 2.

Benzoinated Lard	96 grammes.
White Wax	1'50 "
Japan Wax	2'50 "

This gave a product almost identical with the one prepared by using benzoinated lard made according to Formula No. 1.

In making cold cream the following formula was used:

FORMULA NO. 1.

Spermaceti	12'5 grammes.
Japan Wax	10'0 "
Expressed Oil of Almond	62'0 c.c.
Stronger Rose-Water	19'0 "
Sodium Borate	0'5 grammes.

This gave a product which compared favorably with the official ointment except in color which was slightly darker.

A second sample was made according to the following formula:

FORMULA NO. 2.

Japan Wax	22'5 grammes.
Expressed Oil of Almond	62' c.c.
Stronger Rose-Water	19' "
Sodium Borate	0'5 grammes.

The consistence of this was a trifle too hard, but the color compared favorably with sample No. 1.

Tar ointment was made according to the following formula:

FORMULA NO. 1.

Tar	50 grammes.
Japan wax	10 "
Lard	40 "

This gave a product comparing well with the U.S.P. ointment, it being however lighter in color.

A second sample was made, using the following formula:

FORMULA NO. 2.

Tar	50 grammes.
Yellow wax	5 "
Japan wax	5 "
Lard	40 "

This formula gave a product almost identical with the U.S.P. product both in general appearance and color.

Several of the ointments which are made by incorporation by using benzoinated lard as a base (the benzoinated lard was made according to Formula No. 1), were made, and the results were very gratifying.

In making simple cerate the following proportions were used:

Japan wax	20 grammes.
Lard	80 "

The consistence of this product was similar to the one prepared according to the U.S.P. directions, the color being about a shade darker.

The following formula was used in preparing camphor cerate:

Camphor liniment	10 grammes.
Japan wax	20 "
Lard	70 "

This formula produced a very nice cerate conforming in all respects with the U.S.P. product.

The following formula was used in preparing the cantharides cerate:

FORMULA NO. 1.

Cantharides in No. 60 powder	32 grammes.
Japan wax	12 "
Resin	18 "
Lard	28 "
Oil of turpentine	15 c.c.

The consistence of this cerate was about the same as the U.S.P. product, the appearance was more translucent and lighter in color.

A second sample was made, in which the following proportions were used:

FORMULA NO. 2.

Cantharides in No. 60 powder	32 grammes.
Yellow Wax	5 "
Japan "	7 "
Resin	18 "
Lard	28 "
Oil of Turpentine	15 c.c.

The consistence of this cerate was about the same as the one prepared according to Formula No. 1, the color being almost identical. The following formula was used for spermaceti cerate:

Spermaceti	10 grammes.
Japan Wax	25 "
Olive Oil	65 "

The consistence and color of this cerate were almost identical with the U.S.P. product.

Goulard's cerate was made according to the following formula (the camphor cerate having been previously made by using Japan wax):

Goulard's Extract	200 grammes.
Camphor Cerate	800 "

This cerate was all that could be desired, it being of a nice white color, and no oxidation taking place, after standing for more than a year.

Resin cerate was made according to the following formula:

Resin	35 grammes.
Japan Wax	10 "
Lard	55 "

This had about the same consistence as the U.S.P. product.

✓

A NEW TEST FOR COCAINE.

BY DR. GEORGE L. SCHAEFER.

There are two well known tests for determining the freedom of commercial cocaine salts from other coca alkaloids. These are the permanganate test for detecting cinnamyl-cocaine, and the ammonia test, popularly known as McLagan's test, for detecting the presence of the coca alkaloids which are resistant to permanganate.

While it is generally admitted that the permanganate test is sufficient to detect the presence of cinnamyl compounds, chemists have expressed some doubt regarding the value of McLagan's test. The writer has for some time been conducting experiments with the object of finding a substitute for McLagan's test which would allow of the rapid and accurate determination of the presence in cocaine salts of the coca alkaloids not indicated by the permanganate test.

As the result of numerous determinations, I have devised a test based on the fact that the chromates of these alkaloids are much less

soluble than cocaine chromate, both in water and in water acidulated with hydrochloric acid. The relative solubility of the chromates in acidulated water is about 1 to 500 in the case of cocaine chromate, and 1 to 5,000 in the case of the residual alkaloidal chromates.

I therefore offer the following as a simple and satisfactory method of determining the purity of cocaine salts: 0.05 gramme cocaine hydrochlorate is dissolved in 20 c.c. of distilled water, mixed with 5 c.c. of a 3 per cent. solution of chromic acid, and to the mixture 5 c.c. of a 10 per cent. solution of hydrochloric acid are added. It is advisable to keep the temperature of the solution at 15° C. If the cocaine hydrochloride be pure a clear solution will result. If other than traces of foreign coca bases be present the solution becomes cloudy at once, or in a few minutes, according to the amount of impurity present.

It is advisable to make the test side by side with a specimen of known purity for comparison.

N. Y. QUININE AND CHEMICAL WORKS,

March 27, 1899.

THE UNITED STATES AND BRITISH PHARMACOPŒIAS.

BY CLEMENT B. LOWE.

The advent of the fourth British Pharmacopœia (B.P.) last year, invites not only comment upon it, but also comparison with the Pharmacopœia of our own country, the U.S.P., which became official January 1, 1894. Comparisons have been said to be odious, but they are not necessarily so; it depends entirely upon the motive in making them, and the way in which they are made.

The first comparison to claim our attention is the authority behind the books. The B.P. can claim to be a strictly official work, fully entitled to bear upon its cover the gold stamp of the royal arms and the words, "By Authority," as it is issued pursuant to Acts of Parliament of 1858 and 1862. The U.S.P. can only be regarded as semi-official, it never having been recognized by any law of the land as the supreme medical authority for the whole country, and yet it has been made by Act of Congress a legal authority in the conduct of the Department of Customs, of the Army, Navy and Marine Hospital Service, and of the District of Columbia and other

territories within the jurisdiction of the United States laws. It is also a legal authority in a number of States. Outside of these limits its authority is only moral, and yet it has the loyal support of the great majority of the physicians and pharmacists of our country.

The make-up of the bodies under whose direct authority these works are issued is altogether different. The B.P. is issued by the "General Council of Medical Education and Registration of the United Kingdom." This council is made up of thirty members, eighteen elected by the medical colleges or universities, one each by the Apothecaries' Society of London and Apothecaries' Hall of Ireland, five nominated by the Queen, and five direct representatives, one of the latter probably being an apothecary, so that the pharmacists have a *one-tenth* representation in the council. The general supervision of the work was performed by a committee of nine of the General Council (*two* of whom were apothecaries). This committee graciously acknowledged the great value of the assistance rendered by a committee of twelve of the Pharmaceutical Society of Great Britain, and also that of a number of eminent referees. The editing of the work was performed by the distinguished chemist, Prof. John Attfeld. Some of the pharmacists of Great Britain are not satisfied with the present arrangement, but think that the revision of their Pharmacopœia should be assumed by the British Pharmaceutical conference, with the co-operation of the Pharmaceutical Associations and Societies of Great Britain, Ireland and the Colonies.

The U.S.P. is revised by a committee appointed by the "National Convention for Revising the Pharmacopœia," which meets in Washington at the commencement of each decade. The convention is made up of three accredited delegates from each of the incorporated National and State Medical and Pharmaceutical Associations, and Colleges of Medicine and Pharmacy, in continuous operation for at least five years immediately preceding; in addition the Army, Navy and Marine Hospital Service are represented by three delegates each. The committee in charge of the last revision consisted of twenty-five members, the majority of whom were pharmacists.

The books when compared from a typographical standpoint are both found to be 8vo's, although the B.P. is smaller, being $8\frac{1}{2} \times 5\frac{1}{2}$ inches, containing 535 pages. The binding of the B.P. is superior,

as the back is fastened to the lids by tape and the edges of the leaves are stained red; the paper, however, is a little thin, the impressions showing through the leaves to some extent. The U.S.P. is $9\frac{1}{4}$ x 6 inches, containing 602 pages, the printing is rather more distinct and the titles stand out more prominently, owing to their being in heavier type. In comparing the contents of the books, many interesting differences are found; to bring these out more prominently I have tabulated their contents:

A COMPARISON OF THE CONTENTS OF THE U.S.P. WITH THOSE OF THE B.P.

Class.	U.S.P.	B.P.
Drugs of Vegetable Origin	202	142
“ “ Animal “	21	18
“ “ Chemical “	181	129
Acids (not included with chemicals)	32	29
Alkaloids and Alkaloidal Salts	32	25
Cerates	6	
Collodions	4	3
Confections	2	4
Decoctions	2	3
Discs (Lamella)		4
Glucosides and Neutral Principles	6	6
Effervescing Salts	4	6
Elixirs	2	
Emulsions	4	
Extracts, Solid	34	22
“ Fluid	88	16
(Extractum Liquidum, B.P.)		
Lozenge Bases		4
Glycerites	6	9
Honeys	3	2
Infusions	4	22
Injections, Hypodermic		4
Juices (Succi)	1	6
Liniments	9	15
Lotions		2
Masses	3	
Mixtures	4	9
Mucilages	4	2
Oils (Fixed and Volatile)	53	35
Ointments	23	44
Oleoresins	6	
Oleates	3	1
Oxymels		2
Papers (Charta)	2	1
Petroleum Products	3	3
Pills	15	20

Class.	U.S.P.	B.P.
Plasters	13	12
Powders	9	16
Sugars	2	2
Soaps	2	3
Spirits	25	18
Solutions (Liquors)	24	47
" Concentrated		9
Suppositories	1	7
Syrups	32	22
Tablets (Fabella)		1
Tinctures, made by percolation	57	30
" " " maceration	8	23
" " " solution	7	14
Triturations	1	
Troches	15	17
Vinegars	2	3
Waters	19	15
Wines	70	8
Reagents and Test Solutions	116	171
Volumetric Solutions	19	6

Commenting upon the table, we find that the following preparations, are contained only in the U.S.P., viz.: Cerates, Elixirs, Emulsions, Masses, Oleoresins and Triturations. The following only in the B.P., viz.: Discs, Lozenge Bases, Hypodermic Injections, Lotions, Oxymels, Concentrated Solutions and Tablets. The formula of the troches of the B.P. differ from those of the former edition, and also from those of the U.S.P. in being calculated for a single lozenge, the ingredients being then mixed with one of the four lozenge bases to form a lozenge. The lozenge bases consist of the fruit basis flavored with black-currant paste, the rose basis flavored with rose-water, the simple basis without flavor and the tolu basis flavored with tincture tolu, and apparently intended as a vehicle for salts of the alkaloids. The hypodermic injections, which comprise apomorphine, cocaine, ergotin and morphine, are not popular in the United States, preference being given to the hypodermic tablets on account of their portability and permanence. The discs (lamellæ) are minute medicated discs of gelatin, each about $\frac{1}{50}$ grain. They comprise the following: atropine, $\frac{1}{5000}$ grain, cocaine, $\frac{1}{30}$ grain (formerly $\frac{1}{50}$), physostigmine, $\frac{1}{1000}$ grain, and a new one, homatropine, $\frac{1}{100}$ grain. They do not seem to be used by our oculists to any great extent, the solutions being preferred. The concentrated solutions (Liquores Concentrati) is a new class of preparations, which

are really weak tinctures, as they are mostly made by percolation with 20 per cent. alcohol. It comprises those of calumba, cusparia, krameria, quassia, rheum, sarsaparilla comp., senega, senna and serpentaria, tabella trinitrin (nitroglycerin tablets), each contain chocolate 5 grains and $\frac{1}{100}$ grain nitroglycerin. The comparative strength of the acids is exhibited in the following table:

Acid				U.S.P.	B.P.
Acetic		by weight		36'	33'
" "	Dil.	"		6'	4'27
" "	Glacial	"		99'-100'	99'
" Hydrobromic	Dil.	"		10'	10'
" Hydrochloric		"		31'9	31'79
" "	Dil.	"		10'	10'58
" Hydrocyanic	"	"		2.	2.
" Lacticum		"		75'	75'
" Nitricum		"		68'	70'
" "	Dil.	"		10'	17'44
" Phosphoricum		"		85'	66'3
" "	Dil.	"		10'	13'8
" Sulphuricum		"		92'5	98'
" "	Dil.	"		10'	13'65
" Sulphurosum		"		6'4	6'4

Of the extracts B.P. three are standardized, and two (Ext. Bellad. Viride and Ext. Hyoscyam. Viride) are made from green drugs. The strength of the fluid extracts is the same in both Pharmacopæias, viz., 1 gramme of the drug to 1 c.c. The U.S.P. is especially rich in this class of preparations, there being an excess of 72 over the number in the B.P., only one (nux vomica) being standardized to five of the B.P., viz., belladonna, cinchona, ipecac, nux vomica and opium. The B.P. is especially rich in infusions and ointments. Percolation does not seem to be making headway across the water, as in the former B.P. 47 tinctures out of 77 were made by percolation; in the new B.P., 30 out of 67. The tinctures in the B.P. which are made by percolation are mostly made after a general formula, no special directions being given in the individual formula for packing the drug in the percolator, the matter being left to the judgment of the operator. This, it seems to me, is a very important omission, which may affect the result in a number of cases.

Another difference is that the B.P. directs the marc to be expressed, the liquid thus obtained to be filtered and added to the percolate, sufficient menstruum then being added to produce the required volume of tincture. Eight of the tinctures of the B.P.

have been standardized to five of the U.S.P. The following table gives the strength of those tinctures which differ most:

	Grammes in 100 c.c.	
	U.S.P.	B.P.
Tinct. Aconite	35	5
" Aloes	10	2'5
" Arnica Rad.	10	5
" Cantharis	5	1'25
" Cimicifugæ	20	10
" Cinnamomi	10	20
" Colchici Sem.	15	20
" Gelsemi	15	10
" Hydrastis	20	10
" Hyoscyami	15	10
" Iodi	7	2'5
" Opii (Morphine)	1'3-1'5	0'75
" Quillajæ	20	5
" Scillæ	15	20
" Serpentariæ	10	20
" Strophanthi	5	25

It will be noticed that there is a great difference in the strength of some of the most active tinctures, especially of those which are oftenest prescribed, *e. g.*, Tinct. Aconite U.S.P. is seven times stronger than the B.P. tincture, Tinct. Cantharides four times as strong, Tinct. Iodine nearly three times as strong, Tinct. Strophanthus twice as strong and Tinct. Opium about twice as strong. It seems not only extremely unfortunate, but also highly dangerous, that there should be such differences in strength in the preparations of two nations speaking the same mother tongue, and commercially so closely related to each other. If an English or Canadian physician visiting this country should use or prescribe Tinct. Aconite U.S.P. in the same doses as the B.P. tincture, it would inevitably be fatal.

A very striking difference in the pharmacopœias is in the weights and measures. In the U.S.P. the metric weights and measures only are used; in the B.P. the Imperial weights and measures (the Imperial ounce containing 437·5 grains, the Imperial pint 20 fluid ounces), alternative formula (which are only proximate) being given in metric weights and measures. To show how cumbersome is the B.P. system of weights and measures, I quote from the formula of Acidum Sulphuricum Dilutum B.P.: It is directed to take sulphuric acid 1 fluid ounce and $5\frac{1}{4}$ drachms (more exactly 1·65 fluid ounces),

or 1,333 grains, and distilled water a sufficient quantity to make 1 pint. The alternative formula is sulphuric acid 82.7 c.c. (or 152.4 grammes) and distilled water a sufficient quantity to make 1,000 c.c. In the U.S.P. we are simply directed to use 100 grammes sulphuric acid and 825 grammes distilled water.

The present B.P. follows in the footsteps of its predecessor in containing doses of the preparations and of certain of the crude drugs, this apparently not having worked injuriously to British physicians. In the United States the physicians have thus far opposed what they consider a decidedly dangerous innovation. The tests for identity and purity of the individual chemicals in the B.P. are not nearly so numerous as in the U.S.P., but in the appendix is given a concise series of "tests for substances mentioned in the text," *e. g.*, Tests for the Acetates, Bromides, etc.

Thirty-two articles have been introduced into the B.P. which were previously official in the U.S.P., but this is more than offset by the fact that forty-three were dismissed.

In the appendix of the B.P. are some alternative preparations for use in India and the Colonies where there are prevailing high temperatures. If the authority of the U.S.P. shall be extended to our new colonial possessions, similar allowances will also have to be made.

It should be stated, in conclusion, that the new B.P. is a very creditable work, a marked improvement upon its predecessor, but we think the U.S.P. compares quite favorably with it even though it antedates it nearly five years.

RECENT LITERATURE RELATING TO PHARMACY.

PERU BALSAM

H. Thoms (*Berichte d. Deutsch. Pharm. Ges.*, 1898, 264) presents a comprehensive article on the above subject. After a thorough historical review of the chemistry of the balsam and especially of the methods of assay suggested by Gehe & Co. (*Handelsbericht.*, Apr., 1895, 5; and K. Dieterich, *Ber. d. D. Pharm. Ges.*, 1897, 437), he reports an investigation of three absolutely authentic specimens, and agrees with the authors mentioned, that the qualitative nitric acid test should be replaced by an assay based on the percentage of cinnamein and the ester number of the same.

The results of his work are summed up in the following tests that he recommends:

One gramme of the balsam is extracted with ether, the ethereal solution, shaken in separatory funnel with two lots of 20 c.c. 2 per cent. solution of soda (great care being used to prevent emulsification) and the residue in funnel shaken twice with water. The combined aqueous liquids, after warming on water-bath to remove ether, are acidulated with hydrochloric acid and the resin, thereby precipitated, collected on a tared filter, washed free from chlorides and dried at 80°, must not weigh more than 0.28 gramme.

The ethereal solution remaining in funnel, evaporated from an Erlenmeyer flask on water-bath and heated for at least a half hour after free from ether, after twelve hours' rest in a desiccator, should weigh not less than 0.60 gramme.

H. V. ARNY.

CINNAMEIN.

This cinnamein, mixed with 50 c.c. $\frac{1}{10}$ normal alcoholic potassa, after standing an hour by itself and warming an hour on water-bath, on addition of enough water to dissolve the separated potassium salt, is titrated with $\frac{1}{10}$ normal hydrochloric acid—phenolphthalein being the indicator. The difference between cubic centimetres of acid used and 50, multiplied by 0.0056, gives the quantity of potassa necessary for saponification of the cinnamein. One gramme cinnamein should require not less than 0.235 gramme potassa (ester number, 235).

The neutralized solution, after evaporation of alcohol on water-bath and cooling, when shaken with potassium permanganate, smells strongly of benzaldehyde.

The author found in the balsam, vanillin and a principle smelling like coumarin. The latter, however, was in too small quantity for absolute identification. He also examined wood, bark and legumes of *Myroxylon Pareiræ*, finding in all coumarin and cinnamic acid.

H. V. A.

SOLUTION OF ALUMINUM ACETATE.

Candussio (*Pharm. Zeit.*, 1898, 481) discusses that difficult preparation solution of aluminum acetate P. G., recommending as the easiest method of manufacture—addition of acetic acid to the calcium carbonate and pouring this into the solution of aluminum sulphate. He disapproves of the pharmacopœial maceration for twenty-four hours, urging immediate filtration. The official prepa-

ration is apt to gelatinize, due (according to the author) to formation of an allotropic form of basic aluminum acetate $(Al_2(C_2H_3O_2)_4(OH)_2)$. He avoids this by using barium carbonate instead of calcium carbonate in the manufacture.

H. V. A.

PREPARATION OF THE HYDROCHLORATES OF QUININE.

D. Vitali (*Pharm. Zeit.*, 1898, 481) finding the usual method of manufacture (double decomposition of quinine sulphate and barium chloride) unsatisfactory, by reason of barium contamination of product, recommends the following process:

For normal hydrochlorate he warms 17 parts of potassium chloride with an aqueous solution of 100 parts normal quinine sulphate, evaporates to dryness on water-bath and extracts residue with 95 per cent. alcohol, in which the quinine salt dissolves, while potassium sulphate is insoluble. The yellow solution is decolorized with animal charcoal and evaporated.

For acid hydrochlorate he employs 25 parts of potassium chloride to 100 of quinine bisulphate, the process being identical with the preceding one, save that the acid chloride crystallizes from concentrated alcoholic solution, while the normal has to be evaporated to dryness.

H. V. A.

WHEAT OIL.

By the usual methods of grinding, about 1 per cent. of germs is obtained. These germs contain 12.5 per cent. fatty matter, about two-thirds of which can be removed by means of petroleum spirits. The mobile oil is yellowish-brown in color, and has a peculiar odor resembling wheat. It is soluble in ether, chloroform, petroleum ether, carbon bisulphide and glacial acetic acid dissolves an equal volume at 65° C. It is insoluble in cold absolute alcohol.

The oil readily turns rancid. A sample after standing one year contained 43.86 per cent. of free acid, calculated as oleic. The following are some of the important constants of wheat oil:

Specific gravity at 15° C.	0.9245
Solidification-point	15° C.
Melting-point of fatty acids	39.5° C.
Solidification-point of fatty acids	29.7° C.
Saponification value	182.81
Iodine value of oil	115.17
Iodine value of fatty acids	123.27

—G. de Negri, 1898, *Chem. Ztg.*, **22**, 976.

L. F. KEBLER.

PHARMACOLOGICAL NOTES.

STRONTIUM BROMIDE IN EPILEPSY.

Roche (*London Lancet*, October 15, 1898) renews his recommendation of strontium bromide in the treatment of epilepsy, and states that he has not seen any case in which it will not diminish the number of attacks if given properly, and that it does not cause the depression that sometimes attends the use of potassium bromide. In cases in which the aura is sufficiently prolonged, the patient should take 30 grains at once, and repeat the dose every hour if required. In this way the attacks are frequently warded off. Many patients take a dram daily for long periods without ill-effects.—*Phila. Med. Jour.*, p. 946.

J. L. D. M.

LYSOL POISONING.

Heinrich Cramer (*Centralblatt für Gynäkologie*, October 1, 1898) reports a case of lysol poisoning in a primipara, twenty-two years of age, following a normal labor, after a vaginal douche of 4 liters of 1 per cent. solution of lysol had been used. On the afternoon of the same day there was a slight rise of temperature, and a second douche was given. After 1½ liters of the solution had been used the patient became suddenly restless, her breathing heavy, her eyes rolled and she lost consciousness, and her pulse was very rapid and feeble. The douching was stopped and the patient regained consciousness in three minutes, but complained of feeling dizzy and sank into a condition of stupor. On the next day the urine was dark brown, contained blood casts, numerous broken-down red blood-corpuscles and 0.3 per cent. of albumin. The general condition became worse from day to day, and death resulted after a week. Upon necropsy, endometritis, parametritis and endophlebitis of the uterus were found, with hemorrhagic inflammation of the kidneys. Cramer mentions a considerable number of cases of lysol-poisoning, and believes that the drug should be used with care, and that the amount of fluid used should be taken into consideration, as well as its concentration.—*Phila. Med. Jour.*, p. 1066. J. L. D. M.

COMPOSITION OF DIPHTHERIA TOXIN.

P. Ehrlich (*Deutsche Med. Woch.*, No. 38) states beside the essential toxin in diphtheria poison, there are other substances very much less toxic, "toxoids," which are important, however, as they bind

the antibodies the same as the essential toxin. As a diphtheria bouillon culture stands, the toxin diminishes while the toxoids increase. He classifies the toxoids as: protoxoids, which have a stronger affinity for the antitoxin than the genuine toxin; syntoxoids, which have the same affinity as the toxin, and epitoxoids, which have less affinity. He considers the latter as a primary product of the bacillus, and not a transformation product of the diphtheria toxin, and calls them "toxones." These toxoids and toxones are not simple substances, but can be subdivided into what he calls proto, deuterio and tritoxins. His research proves that in the diphtheria toxin molecule there are two independent atom-complexes. One is haptophorous, that is, it binds the antitoxin; the other is toxophorous, the cause of the specific toxic effect. Experiments on frogs disclosed that the first exert their effect even when cold, but that the toxophorous require warmth before they can affect the cells. This difference in time explains the incubation period. There seems to be a further possibility that the protoxoids are able in certain circumstances to effect a direct cure by forcing the toxin out of its combination with the elements of the tissues by means of their stronger affinity for it.—*Four. Amer. Med. Assoc.*, p. 1258.

J. L. D. M.

ANISON, THE NEW ANESTHETIC.

This is a colorless, aqueous solution of trichlor-pseudobutyl-alcohol or acetone-chloroform, and corresponds to a 2 to 2.5 solution of cocaine, but has none of the latter's local irritation and is non-toxic. As much as 17 grains have been used without after-effects. The anesthetic effect is also immediate, with no interval, as with cocaine. In suturing, a small amount of anison injected at the points where the stitches are to be taken will prevent pain. Even inflammatory phlegmonous processes can be rendered perfectly insensible if sufficient anison is used to keep them flooded all the time. The anesthesia was not perfect in all cases, but this can be said of all other anesthetics. L. Sternberge, of Berlin, concludes his report of a dozen tests of anison in the *Klin. Therap. Woch.*, of September 25th, by recommending it as a useful and safe anesthetic.—*Fourn. Amer. Med. Assoc.*, November 12, 1898, p. 1180.

J. L. D. M.

EDITORIAL.

URANIC, THORIC AND POLONIC RAYS.

It is now twenty-five years since Balfour Stewart wrote his remarkable treatise on "The Conservation of Energy." In it was shown, among other things, that the ancients even as far back as Heraclitus, who lived at Ephesus B.C. 500, conceived the idea of the essential unrest and energy of things. He gives us, it will be recalled, at one place, a classification of *energies*, and in doing so proceeds with the following words of caution: "We must warn our readers that this enumeration has nothing absolute or complete about it, representing as it does, not so much the present state of our knowledge as of our want of knowledge, or rather of profound ignorance of the ultimate constitution of matter." Since the publication of this book the law of the conservation of energy has come to be regarded as one of the most essential conditions in nature.

A few years ago the world was startled by the discovery by Professor Roentgen of certain rays from a Crookes' vacuum tube. These rays are not refracted, develop no heat, the retina of the eye is not sensitive to them, and they are without influence upon the most sensitive magnetic instruments. These rays have been called *Roentgen X-Rays*, and are supposed to be due to longitudinal vibrations of ether. In this respect they agree with *Hittorf's Kathode Rays*, but in the latter the waves are of extremely short wave lengths. "*Hertz's electric light waves*," on the other hand, differ from those of either Roentgen or Hittorf in that they are transversal and of greater wave length than either of them. More recently, since the well-known discovery by Roentgen, Becquerel has undertaken to determine the photographic effects of certain phosphorescent and fluorescent substances, and we have as a result of the author's experiments what are known as *Becquerel's Rays*.

In January, 1896, Poincaré inquired, after certain experiments had been made by him, if in all bodies in which the fluorescence is sufficiently intense there is not an emission of Roentgen, as well as luminous rays, no matter what may be the cause of the fluorescence. M. Henry has shown that "phosphorescent sulphide of zinc could produce photographic impressions through a sheet of black paper which was quite impervious to light." Niewenglowski observed the same phenomenon with sulphide of calcium which has been exposed to light. Later on, Troost obtained strong photographic impressions with an artificial phosphorescent hexagonal blende through black paper and thick cardboard. Becquerel made similar experiments with uranium salts, some of which are fluorescent. He obtained photographic impressions through black paper with the double sulphate of uranium and potassium. Becquerel found that uranium and all of its compounds, whether fluorescent or not, act in the same manner, and metallic uranium is the most active of them all. He also noticed that light is not necessary, but that uranium compounds kept in the dark for years continued to act on photographic plates. This was an entirely new phenomenon. He also showed that *uranic rays* were possessed of the following properties: They traverse opaque bodies, but are absorbed more easily and are, therefore, less penetrating than Roentgen rays. They make the air through which they pass a conductor of electricity, as do Roentgen rays; this is an important property of both kinds of rays. Following these results it was only natural to ask if uranium were the only metal possessed of this property, and

Schmidt has found that compounds of thorium are the only ones endowed with similar properties. Uranic rays have been frequently called Becquerel rays; this name may be generalized by applying it also to *Thoric rays* and all rays of that character.

While making certain experiments with a number of minerals which contained either uranium or thorium, for the purpose of measuring the conductivity of the air when under the influence of *hypophosphorescent* or *radio-active* substances it was noticed by S. Curie, that in some cases the intensity of the action was quite unexpected, and the presence of another element was immediately suggested. After considerable experimenting upon one of these minerals, viz.: pitch blende, a body was obtained by chemical means which was about 400 times more active than uranium. This body is supposed to be a new element added to bismuth and it is proposed to call it *Polonium*. Since this research M. and Mme. Curie with G. Bémont have "discovered in pitch blende indications of an element (radium) allied to barium in its chemical properties, but differing in its radio-activity."

The action of uranic, thoric and polonic rays on sensitive plates is various. Those of thorium are the least active. Uranium compounds give an impression in an hour, and sulphide of polonium produces a decided action in from one-half to three minutes.

The fluorescent action produced by the compounds of uranium, thorium and polonium on platinocyanide of barium are equally remarkable. The two former compounds have apparently no action, whereas the sulphide of polonium has a very distinct action. From experiments made with the latter compound, it would appear "that we can obtain an indefinite amount of light without the expenditure of any energy."

In a paper in the *Chemical News*, February 17, 1899, from which we have freely quoted, is found also an interesting discussion on the analogies and differences between Becquerel and other rays. *Becquerel rays*, or those produced by compounds of *Uranium*, *Thorium* and *Polonium*, are characterized by the following properties: "They render gases which they traverse conductors of electricity; they produce photographic impressions. These properties do not in any way depend on the past or present action of light on bodies emitting these rays. They traverse all substances, glass, paper, metals and liquids, but are, as a rule, absorbed to a great extent. Their emission appears to be spontaneous; it is constant, and indicates the presence of certain elements in the active substance. The spontaneous emission of these rays appears to give rise to a continuous disengagement of energy of which we cannot find the source. This is in direct contradiction to Carnot's principle. It is possible, however, to conceive of the production of the phenomenon in different ways. It may be a phosphorescence of considerable duration caused by the action of light. It may be an emission of matter accompanied by a loss of weight of the radioactive bodies or the utilizable energy may be constantly diminishing. Again, it may be a secondary emission produced by rays analogous to X-rays. But it may well be asked whether Becquerel rays may not be produced at the expense of the heat in the surrounding medium, contrary to Carnot's principle."

In view of the knowledge that the investigator in this latter part of the nineteenth century is bringing to light and establishing thereby an apparently new

order of things, we must recall that there has been a gradual evolution since ancient times, and, step by step, a clearer insight into the workings of nature has been gained. There is so much that is new and so much plausibility in everything that is new, that we wonder sometimes, if the present rate of progress keeps up, what a task it will be for the student of 100 years hence simply to know what is known of a very fragmentary part of the whole. And further, how difficult it will be to put the whole together to get any adequate conception of how intricate and wonderful the universe is in its make-up. It may not be amiss to recall a few words of Balfour Stewart, who wrote at a time when his mind was not befogged by the results of numerous observers since his time.

"The ancients possessed great genius and intellectual power, but they were deficient in physical conceptions, and in consequence their ideas were not prolific. It cannot be said that we, of the present day, are deficient in such conceptions; nevertheless it may be questioned whether there is not a tendency to rush into the opposite extreme and to work physical conceptions to an excess. Let us be cautious that in avoiding Scylla we do not rush into Charybdis. For the universe has more than one point of view, and there are possibly regions which will not yield their treasures to the most determined physicists, armed only with kilogrammes and metres and standard clocks."

REVIEWS AND BIBLIOGRAPHICAL NOTICES.

CHEMISTRY: General, Medical and Pharmaceutical including the Chemistry of the U. S. Pharmacopœia. By John Attfield, F.R.S. New (sixteenth) edition. In one royal 12mo. volume of 784 pages with eighty-eight illustrations. Cloth, \$2.50, net. Lea Brothers & Co., Philadelphia and New York.

The present edition corresponds to the concurrently produced seventeenth British edition. It is a revision of the fourteenth American edition, which appeared toward the close of 1894. In revising several changes have been made in the chemical names; much of the text has been rewritten; a few sections have been rearranged to make the order of treatment more logical; and some new topics have been introduced. By eliminating some of the less important matter, the author has been able to keep the work within the size of its predecessors. The book is intended as a learner's manual, and, in this capacity, the present edition will maintain the long-established and well-deserved reputation which the work enjoys.

JOSIAH C. PEACOCK.

ANNUAL AND ANALYTICAL CYCLOPEDIA OF PRACTICAL MEDICINE. By Charles E. de M. Sajous, M.D., and one hundred associate editors assisted by corresponding editors, collaborators and correspondents. Illustrated with chromo-lithographs, engravings and maps, Volume II, Philadelphia, New York and Chicago. The F. A. Davis Company, Publishers, 1899.

In the first volume the majority of sections were prepared under the immediate supervision of the editor. In the second volume, at hand, all of the articles have been prepared by their respective editors. The aim of the editor is not only to facilitate the labor of the practicing physician and to assist investigators and authors in their researches, but he also seeks to elucidate, through

contributions from men possessing special knowledge or unusual experience in a particular line, diseases which, owing to their complexity are not generally understood. This plan has borne fruit and the readers have before them in this volume exceptionally valuable articles on a number of exacting subjects, viz.: "Cerebral Hæmorrhage," by Dr. Browning, of Brooklyn; "Cirrhosis of the Liver," by Professor Adami, of Montreal; "Cholera," by Professor Rubino, of Naples; "Cholelithiasis," by Professor Graham, of Toronto; "Diabetes," by Professor Lépine, of Lyons. The better known affections have also been edited by writers of special ability. Among the articles of this kind is that on "Diphtheria," by Drs. Northrup and Bovaird, of New York. Among other papers may be mentioned that on "Cataplexy," by Professor Eskridge, of Denver; "Chorea," by Professor Bondurant, of Mobile; "Cocainomania," by Dr. Kerr, of London; "Constipation," by Prof. N. S. Davis, of Chicago; "Dilatation of the Heart," by Dr. Vickery, of Boston.

The work is well done and every effort has been made to make it one of the most important contributions to scientific medicine. The illustrations are well made and the whole work well executed, and reflects credit on editor and publishers alike.

THE MEDICAL NEWS POCKET FORMULARY for 1899. By E. G. Thornton, M.D. Lea Bros. & Co. 1899.

This work consists of a collection of formulæ on various medical subjects, beginning with abortion (to prevent) down to yellow fever. The author says of the work: "That there is a broad and legitimate field of usefulness for works of this character is self-evident." It may be that the newly graduated M.D. is at a loss how and what to prescribe. It may be that there are physicians who are in need of works of this character. No doubt the same arguments may be employed in support of this "Pocket Formulary" as are made by those who write and utilize quiz compends. Both classes of publications may be useful apparently to some people, but we believe that every student ought to make his own quiz compend from the lectures he attends, the literature he reads and the results of his experience, and so the physician ought to make his own Formulary in a like manner. The real benefactors do not necessarily alleviate temporary conditions. We cannot help but think that works of this character tend to promote quackery and develop anything but a scientific medicine. What we want is less work on Pocket Formularies and more effort put in the direction of the National Formulary. Elevate the latter and you develop the character of physician and pharmacist. We do not mean to reflect on this particular book, as the work has been well done and the selections are carefully made. It is the principle, however, that we would not promulgate.

DIGEST OF CRITICISMS ON THE UNITED STATES PHARMACOPOEIA. Seventh Decennial Revision (1890). Part II. Published by the Committee of Revision and Publication of the Pharmacopœia of the United States of America (1890-1900).

This part contains abstracts from all accessible sources up to the end of December, 1897. The compilation was made by Hans M. Wilder, and was passed through the press by him and Dr. Charles Rice conjointly. The work is invaluable to all investigators in pharmaceutical work, and may be had upon

request to the Committee of Revision, and the enclosing of 6 cents to defray postage.

THIRD REPORT ON THE LLOYD MYCOLOGICAL MUSEUM. For the year 1897. By C. G. Lloyd, Cincinnati, Ohio.

Nine hundred and nineteen named specimens have been added to this collection.

COMPILATION OF THE VOLVÆ OF THE UNITED STATES. C. G. Lloyd.

The various genera which were formerly included in the Friesian genus *Agaricus* are arranged under the tribes proposed by W. G. Smith some thirty years ago.

THE FLORA OF MOUNT KOSCIUSKO. By J. H. Maiden, Department of Agriculture, Sydney, New South Wales. Miscellaneous Publication, No. 241.

Mt. Kosciusko is the highest mountain in Australia, and has been talked of as a sanatorium. Mr. Maiden gives a record of the plants actually found on Mt. Kosciusko.

LA NATURALEZA. Periódico Científico de la Sociedad Mexicana de Historia Natural. Publicado bajo la Dirección del Sr. Dr. Manuel M. Villada. Segunda Serie. Tomo II y III. Cuadernos Números, 12, 1 y 2.

This publication of the Natural History Society of Mexico contains interesting information on the fauna and flora of Mexico. Among these is an excellent illustration with description of *Erythroxylon ellipticum*, J. Ramirez.

EXPERIMENTAL FARMS. Report of the director, Wm. Saunders, to the Honorable Minister of Agriculture of Ottawa.

Among other things which are contained in this report it would appear that smutty oats soaked in Bordeaux moisture for four hours are rendered as free from smut as if soaked for 8, 12 or 24 hours. It appears to be equally efficient as the potassium sulphide test, which is more expensive and requires a longer treatment for its effects to be realized.

COLLEGE OF PHARMACY OF THE CITY OF NEW YORK.

At the regular quarterly meeting of the New York College of Pharmacy held on January 17th, the subject of Cod Liver Oil was discussed by various speakers: The first paper was on some "Notes on the Codfish, its Related Species, Food, Habits and Propagation." Illustrated by stereopticon views, by Major Fred Mather, lately in charge of the Fish Hatcheries at Cold Spring Harbor. Following this J. H. Stallman, of Stallman & Fulton, gave a communication on "The Commerce in Cod Liver Oil." A paper on "The Chemistry of Cod Liver Oil" was given by E. H. Gane, Ph.C., with McKesson & Robbins. This was followed by an article on "The Pharmacy of Cod Liver Oil," by Caswell A. Mayo, Ph.G.

THE PHILADELPHIA COLLEGE OF PHARMACY.

ANNUAL MEETING.

The annual meeting of members of the College was held on March 27, 1899, at 4 P.M. The President, Charles Bullock, presided. The proposition to amend By-laws Chap. IV, Art. IV, was referred by the Board of Trustees to the members of the College. The amendment was approved, action to be taken thereon at the next stated meeting in June. The annual meeting being the occasion for reports of the officers and standing committees, these were given in the following order: The Committee on Publication gave a report which corresponded quite closely in essential details to that presented last year. The report of the Editor was in part as follows:

"Of the twelve issues published during the last year, two were edited by the late Professor Trimble, and the remaining numbers by the acting editor.

"It ought to be mentioned that any favorable features of the Report of the JOURNAL for the present year represent, certainly in part, the fruition of the unselfish labors of Professor Trimble.

"The total number of pages published were 651. These were devoted to 68 original papers; 38 illustrations; 7 reprinted articles from other journals; 328 abstracts of literature relating to pharmacy and allied subjects, and 90 reviews and bibliographical notices: and in addition 7 biographical sketches and special reports of various pharmaceutical and scientific associations, as well as the reports of the pharmaceutical and other meetings of the College.

"The original articles have been contributed by some of the foremost writers on pharmaceutical subjects in this country, as well as by some from abroad. And further, a hearty co operation is manifest in the numerous reviews and abstracts being furnished the JOURNAL by prominent investigators in their special lines, besides one or more contributions from all of the members of the faculty of our own College."

The Curator, J. W. England, presented a report of the condition of the Museum and its accessions during the year. One of the most notable was a collection of upwards of 300 specimens of crude drugs from many parts of the world received from the Philadelphia Museums, through Mr. Howard B. French. The Curator presented two recommendations. The one, a suggestion of Mr. James C. Perry, that a working collection of the nearly 1,000 official drugs and preparations be placed in the Students' Reading-room, alongside of the Students' Herbarium, so that both could be used, side by side, and day by day. The other recommendation was that cases be built along the west wall of the Museum, below the window sill, with upper cases in each of three blank wall spaces, the tops of the latter to be on a level with the other high cases in the room.

Both recommendations were received and referred to the Board of Trustees with a favorable recommendation.

The Librarian, Thomas S. Wiegand, reported that during the past year there had been added to the library by presentation 150 volumes, including nearly 100 from the family of the late Professor Trimble; by purchase, 30 volumes, not including the serials received as exchanges for the AMERICAN JOURNAL OF PHARMACY, which number nearly 149 separate publications.

The donations were in some classes extremely valuable, and make the chemical section of the library of much greater use than ever before.

An election of Officers and Trustees being a part of the action of this meeting, nominations being made and a ballot ordered, the Tellers reported the result as follows : President, Charles Bullock ; First Vice-President, Wm. J. Jenks ; Second Vice-President, Howard B. French ; Recording Secretary, W. Nelson Stem ; Corresponding Secretary, Dr. A. W. Miller ; Treasurer, James T. Shinn ; Librarian, Thos. S. Wiegand ; Curator, Jos. W. England ; Trustees for three years, T. M. Perot, Prof. Jos. P. Remington, C. C. Meyer ; Trustees for unexpired terms, E. T. Dobbins, H. L. Stiles ; Publication Committee, Prof. Henry Kraemer, Editor, Henry N. Rittenhouse, Wallace Procter, Jos. W. England, Prof. Sam'l P. Sadtler.

Meeting, on motion, adjourned.

WM. B. THOMPSON, *Secretary*.

SEVENTY-EIGHTH ANNUAL COMMENCEMENT.

The exercises connected with conferring the degrees of Doctor in Pharmacy and Pharmaceutical Chemist were held in the Academy of Music, Wednesday evening, April 19th, at 8 o'clock.

Prayer was offered by Rev. Floyd W. Tompkins.

The degrees were conferred by Charles Bullock, President of the College.

The following received the degree of Doctor in Pharmacy :

<i>Name.</i>	<i>Subject of Thesis.</i>	<i>State.</i>
Allen, Milton Deronda,	<i>Syrup and Sugar,</i>	New Jersey.
Andrews, Willard Crandall,	<i>Acidum Carbolicum,</i>	Ohio.
Arnott, William,	<i>Syrupus Ferri Iodidi,</i>	Delaware.
Aughinbaugh, John Keely,	<i>Saffron,</i>	Pennsylvania.
Bachman, Herbert Keck,	<i>Liquor Potassæ,</i>	Pennsylvania.
Ball, Clifford Arthur,	<i>Castor Oil,</i>	Pennsylvania.
Bamford, Melvin William,	<i>Powdered Drugs,</i>	Pennsylvania.
Bear, Benj. Samuel Janney,	<i>Oleum Morrhuæ,</i>	Pennsylvania.
Beddow, Llewellyn Jenkins,	<i>Ammonia Water,</i>	Pennsylvania.
Blankemeyer, Henry John,	<i>Advantages of Modern Pharmacy,</i>	Pennsylvania.
Booth, John Henry,	<i>Liquor Potassæ,</i>	Pennsylvania.
Brookes, Lulu (Ph.G.),	<i>Bismuth Sub-carbonate,</i>	Texas.
Brown, Hampton H.,	<i>Successful Drug Clerk,</i>	Pennsylvania.
Buckingham, Harry S.,	<i>Mass of Quinine Sulphate,</i>	New Jersey.
Chalquest, Gustave Emil,	<i>Rhus Radicans,</i>	New Jersey.
Chamberlain, Lowell H.,	<i>Therapeutical Uses of Opium,</i>	Iowa.
Chamberlin, William A.,	<i>Fanatics in Science,</i>	Indiana.
Clark, John Edward,	<i>Belladonna,</i>	Pennsylvania.
Cockroft, David Holiday,	<i>Starches,</i>	Pennsylvania.
Cohen, John Thomas,	<i>Acidum Phosphoricum,</i>	Pennsylvania.
Crawford, Horace Victor,	<i>Euphorbia Ipecacuanha,</i>	Pennsylvania.
Culby, Walter Gibson,	<i>Official Preparations of Opium,</i>	Pennsylvania.
Curtis, Henry,	<i>Eucalyptus Globulus,</i>	Minnesota.
Davis, Berryman K.,	<i>Sanitary Science in Pharmacy,</i>	Missouri.
Davis, Benjamin Winter,	<i>Successful Pharmacy,</i>	New Jersey.
Davis, Samuel Bond,	<i>Konseals,</i>	New Jersey.
De Buest, William Hare,	<i>Volumetric Analysis of Citric Acid,</i>	Pennsylvania.
Diehl, George Edward,	<i>Benzin,</i>	W. Virginia.
Dixon, John Glaspey,	<i>Syrupus Acidi Hydriodici,</i>	New Jersey.

Name.	Subject of Thesis.	State.
Doherty, Harry Aloysius,	<i>Liquor Zinci Chloridi U.S.P.</i> ,	New Jersey.
Donnelly, Clarence Eugene,	<i>Liquor Magnesii Citratis</i> ,	New Jersey.
Doubler, George Hougén,	<i>Methyl Salicylate</i> ,	Pennsylvania.
Egel, Frederick William,	<i>Liquor Sodæ</i> ,	New Jersey.
Falkenhainer, Charles, Jr.,	<i>Ferri Sulphas Exsiccatus</i> ,	Iowa.
Faulhaber, Gustave Adolph,	<i>Scopolia Carniolica</i> ,	Ohio.
Fishburne, Richard Levis,	<i>Cod-Liver Oil</i> ,	Pennsylvania.
Fleming, Arthur Bowles,	<i>Emulsion of Cod-Liver Oil</i> ,	Pennsylvania.
Foltz, Edgar David Grant,	<i>A Successful Pharmacist</i> ,	Pennsylvania.
Gasslein, Richard Joseph,	<i>Combined Drug Mill and Sieve</i> ,	Pennsylvania.
Grady, Wm. Patrick,	<i>Benzin Extraction</i> ,	Pennsylvania.
Gryning, John Francis,	<i>Camphor Tree and its Products</i> ,	Pennsylvania.
Hammond, Nathan Browne,	<i>Advantages of Collegiate Pharma- ceutical Training</i> ,	Pennsylvania.
Hance, Howard Ivins,	<i>Examination of Strychnine Sulphate</i> ,	Pennsylvania.
Hannum, John Lewis,	<i>Beet Sugar Industry</i> ,	Pennsylvania.
Harvey, Charles John,	<i>Liquor Magnesii Citratis</i> ,	Pennsylvania.
Heineberg, Alfred,	<i>Investigation of Jalap</i> ,	Alabama.
Hetrick, Harry Leady,	<i>Aconitum</i> ,	Pennsylvania.
Heyl, Charles Ambrose,	<i>Official Chlorinated Compounds</i> ,	Pennsylvania.
High, Raymond,	<i>Syrupus Ipecacuanhæ</i> ,	Pennsylvania.
Hoagland, Robert John,	<i>Improvements of Three Official Syr- ups</i> ,	Illinois.
Hoch, Quintus,	<i>Acidum Aceticum</i> ,	Pennsylvania.
Holland, Albert James F.,	<i>Unguentum Hydrargyri Nitratis</i> ,	Pennsylvania.
Holt, Edwin Merrimon,	<i>Syrupus Lactucarii</i> ,	N. Carolina.
Hottenstein, Peter David,	<i>Ammonium</i> ,	Pennsylvania.
Huzzard, Curtis,	<i>Ergota</i> ,	Pennsylvania.
Jackson, Charles Henry,	<i>Estimation of Lithia Tablets</i> ,	New Jersey.
James, Arthur Bernstein,	<i>Safeguards against Deterioration of Stock</i> ,	New York.
Jenkins, David Evans,	<i>Elixirs</i> ,	Pennsylvania.
Kaderly, Eugene John,	<i>Estimation of Pills of Ferrous Iodide</i> ,	Ohio.
Keiser, Frederick Ilick,	<i>Unguenta</i> ,	Pennsylvania.
Kemp, Lucien Scott,	<i>Tincture of Iodine</i> ,	Ohio.
Kimberlin, Frederick Wm.,	<i>Phytolacca Decandra</i> ,	Pennsylvania.
Klusmeyer, Harry Chester,	<i>Fluid Extract of Kola</i> ,	Pennsylvania.
Koch, Christopher, Jr.,	<i>Commercial Sodium Thiosulphate</i> ,	Pennsylvania.
Kraus, Wm. Fred. Constn.,	<i>Emulsions</i> ,	Pennsylvania.
Krehl, Benjamin,	<i>Pancreatinum</i> ,	New York.
Kyser, George H. (P.C.)	<i>Gossypium</i> ,	Alabama.
Lauer, Julius Paul,	<i>Commercial Malt Extract</i> ,	Pennsylvania.
Lehman, George Theodore,	<i>Oleum Olivæ</i> ,	Ohio.
Lock, William,	<i>The Microscope</i> ,	Pennsylvania.
Love, Thomas B.,	<i>The Remington Pestle</i> ,	Pennsylvania.
McClintock, Theodore B.,	<i>Assay of Fluid Extract of Guarana</i> ,	New York.
McCluse, Richard Ferris,	<i>Examination of Glycerin</i> ,	Delaware.

<i>Name.</i>	<i>Subject of Thesis.</i>	<i>State.</i>
McCollin, James Garrett, Jr.,	<i>Examination of Tinctura Ferri Chloridi,</i>	Pennsylvania.
McDonnell, Joseph Francis,	<i>Honey,</i>	Pennsylvania.
McFall, John Allen,	<i>Valuation of Compound Jalap Powder,</i>	S. Carolina.
MacPherran, Ivan LeRoy,	<i>The Soda Fountain,</i>	Pennsylvania.
Mervine, Graydon Duncan,	<i>Cera Flava,</i>	Pennsylvania.
Moury, Joseph Daniel,	<i>Belladonna,</i>	Pennsylvania.
Mutty, Walter Clement,	<i>Terebinthina Canadensis,</i>	Maine.
Nicklas, David Edwards,	<i>Koumiss,</i>	Pennsylvania.
Osterlund, Otto William,	<i>Cinchona and its Bast Fibres,</i>	Sweden.
Patrick, William Smith,	<i>Formaldehyde,</i>	New Jersey.
Pflieger, Ellwood Keech,	<i>Liquor Potassii, Arsenitis</i>	Pennsylvania.
Price, Arthur Chew,	<i>Sponges,</i>	Delaware.
Radefeld, Robert Hugo,	<i>Bismuthi Subnitras,</i>	Pennsylvania.
Ranck, David Walter,	<i>Valuation of Diluted Hydrobromic Acid,</i>	Pennsylvania.
Roberts, DeWilton Smith,	<i>Camphora,</i>	Pennsylvania.
Roessner, Benjamin,	<i>Eugenia Jambolana,</i>	Pennsylvania.
Rogers, Edward Bancroft,	<i>Liquor Calcis,</i>	New Jersey.
Ross, Dell Noblit,	<i>Suppositoria,</i>	Pennsylvania.
Schwaemmle, Fred. P., Jr.,	<i>Pharmacy as a Profession,</i>	Pennsylvania.
Seitz, John Alphonsus,	<i>Liquor Hydrargyri Nitratis,</i>	Delaware.
Seubert, Charles Aloysius,	<i>Rhus Toxicodendron,</i>	Pennsylvania.
Shannon, Samuel Coward,	<i>Yellow Mercuric Oxide,</i>	Pennsylvania.
Sheehan, William Henry,	<i>Pepsinum,</i>	Pennsylvania.
Shirey, Orville Ludwig,	<i>Valuation of Spiritus Ammoniae Aromaticus,</i>	Pennsylvania.
Sipes, Clarence Leslie,	<i>Examination of Fluid Extract of Witch Hazel,</i>	Pennsylvania.
Smith, Arthur N. (Ph.G.),	<i>Tragacantha and Acacia,</i>	Pennsylvania.
Smith, Charles E. Rupert,	<i>Passiflora incarnata,</i>	Pennsylvania.
Snyder, Herman Hugo,	<i>Confectio Rosæ,</i>	Pennsylvania.
Stahlé, Robert Nevin,	<i>Cod-Liver Oil,</i>	Pennsylvania.
Stang, Peter,	<i>Valuation of Donovan's Solution,</i>	Pennsylvania.
Steel, Chalmers Alexander,	<i>The Model Pharmacy,</i>	Pennsylvania.
Stout, Philip Samuel,	<i>Ground Nut Oil,</i>	Pennsylvania.
Strode, R. Clark,	<i>Camphor,</i>	Pennsylvania.
Turner, Joseph Constant,	<i>Phytolacca decandra,</i>	Pennsylvania.
Tyler, William Watson,	<i>Aristol,</i>	Virginia.
Underwood, Jas. H. (P.C.),	<i>Calomel,</i>	New Jersey.
VanDyke, James Wilbur,	<i>Distilled Water,</i>	New Jersey.
Watson, James Nathaniel,	<i>Acidum Boricum,</i>	Pennsylvania.
Weakley, William Stair,	<i>Crocus and its Adulterants,</i>	Pennsylvania.
Wiza, Joseph Louis,	<i>Essence of Pepsin,</i>	Pennsylvania.
Wyckoff, Elmer LeRoy,	<i>Nux Vomica,</i>	New York.
Young, Annie Hawkins,	<i>Chloroform,</i>	N. Carolina.
Zeller, Earl Emanuel,	<i>Senna,</i>	Pennsylvania.
Ziegler, Chester Winsor,	<i>Aqua Hydrogenii Dioxidi,</i>	Pennsylvania.

The following received the degree of Pharmaceutical Chemist :

<i>Name.</i>	<i>Subject of Thesis.</i>	<i>State.</i>
Balliet, Howard Paul,	<i>Colchicum,</i>	Pennsylvania.
Hesse, Frederick William,	<i>Hemp,</i>	Georgia.
Mattison, R. Van S., Jr.,	<i>Asbestos,</i>	Pennsylvania.
Shoults, Robt. G. (Ph.G.),	<i>Examination of Acacia,</i>	California.
West, Katharine Powell,	<i>Carica Papaya,</i>	Pennsylvania.

The degree of Graduate in Pharmacy was conferred upon:

<i>Name.</i>	<i>Subject of Thesis.</i>	<i>State.</i>
Morse, Thomas,	<i>Gossypium,</i>	Alabama.

Special certificates for a two years' course in general, applied and analytical chemistry were awarded by Prof. Samuel P. Sadtler to the following:

Kinzey, Calvin Otto, Maryland.
Morgan, Clayton Edward, Massachusetts.
Toplis, William G. (Ph.G.), Pennsylvania.
Wirth, Adam, Louisiana.

The following States and countries were represented by the Graduating Classes:

Alabama	3	Maryland	1	South Carolina	1
California	1	Massachusetts	1	Sweden	1
Delaware	4	Minnesota	1	Texas	1
Georgia	1	Missouri	1	Virginia	1
Illinois	1	New Jersey	14	West Virginia	1
Indiana	1	New York	4		—
Iowa	2	North Carolina	2	Total	127
Louisiana	1	Ohio	5		
Maine	1	Pennsylvania	78		

Prof. Joseph P. Remington, Dean of the Faculty, announced that Melvin William Bamford had attained the grade of Distinguished, and that the following members of the class had attained the grade of Meritorious: Alfred Heineberg, David Evans Jenkins, Theodore Brown McClintock, John Allen McFall, Otto William Osterlund, Edward Bancroft Rogers and Peter Stang.

AWARD OF PRIZES.

The Procter Prize of a gold medal and certificate for highest grade of scholarship and meritorious thesis was awarded to Melvin William Bamford and presented by James T. Shinn.

The William B. Webb Memorial Prize of a gold medal and certificate, offered by Mrs. Rebecca T. Webb, for the highest general average in the branches of committee, operative pharmacy and specimens, was awarded to Melvin William Bamford and presented by Wm. J. Jenks, with honorable mention of Alfred Heineberg, Edward Bancroft Rogers and Peter Stang.

Pharmacy.—A prize of a gold medal, offered by Prof. Joseph P. Remington, for an original device or contrivance useful in practical pharmaceutical work, was awarded to Richard Joseph Gasslein.

Chemistry.—A prize of \$25 in gold, offered by Prof. Samuel P. Sadtler, for knowledge of quantitative chemical analysis, was awarded to Robert Grafton

Shoults, with honorable mention of Charles John Harvey, Orville Ludwig Shirey, Walter Clement Mutty and Peter Stang.

Materia Medica.—A prize of \$25, by Prof. Clement B. Lowe, for the recognition of rare drugs by the aid of the simple microscope only, was awarded to Charles Ellwood Rupert Smith, with honorable mention of Melvin William Bamford, Alfred Heineberg, Berryman K. Davis and Edward Bancroft Rogers.

Pharmacognosy.—A prize of \$25, by Prof. Henry Kraemer, for the best thesis on the pharmacognosy of drugs, was awarded to William Stair Weakley, with honorable mention of Melvin William Bamford and Alfred Heineberg.

American Journal of Pharmacy.—A prize of \$25, by Prof. Henry Kraemer, for a paper (not intended for a thesis) involving original work done in the Chemical Laboratory, was awarded to Christopher Koch, Jr., with honorable mention of Charles Falkenhainer, Jr.

The Maisch Prize.—A prize of \$20, offered by Mr. J. H. Redsecker, of Lebanon, Pa., for histological knowledge of drugs, was awarded to William Stair Weakley, with honorable mention of Melvin William Bamford, Alfred Heineberg, John Allen McFall, Otto William Osterlund, Charles Ellwood Rupert Smith and Peter Stang.

Operative Pharmacy.—A prize of \$20 in gold, by Prof. Joseph P. Remington, for the best examination in operative pharmacy was awarded to Melvin William Bamford, with honorable mention of Henry Curtis, Samuel Bond Davis, William Patrick Grady, Alfred Heineberg, Robert John Hoagland, Quintus Hoch, David Evans Jenkins, Frederick Glick Keiser, Lucien Scott Kemp, David Edwards Nicklas, Otto William Osterlund, Dell Noblit Ross, Orville Ludwig Shirey, Robert Grafton Shoults, Clarence Leslie Sipes, James Wilbur VanDyke and Katherine Powell West.

Theoretical Pharmacy.—A prize of a fine Troemner agate prescription balance offered by Mr. Mahlon N. Kline, of Philadelphia, for the best examination in theory and practice of pharmacy, was awarded to Richard Levis Fishburne.

The Robinson Chemical Prize.—A gold medal and certificate, offered by Mr. James S. Robinson, of Memphis, Tenn., for the best examination in general and analytical chemistry, was awarded to Alfred Heineberg, with honorable mention of Melvin William Bamford.

The valedictory address to the graduating class was delivered by Prof. Clement B. Lowe.

COMPLIMENTARY SUPPER.

The Professors' farewell supper to the graduates was given on Tuesday evening, April 18th, in the Museum of the College. Many of the officers and Trustees of the College were present, as also other invited guests. The supper having been served, the remainder of the evening was devoted to toast-making, Professor Remington, Dean of the Faculty, acting as master of ceremonies. Mr. Bullock, President of the College, responded to the toast "Philadelphia College of Pharmacy." He referred to the fact that it was fifty-two years since he graduated from this College, and that the growth of the institution since that time was remarkable. He also remarked that the results of the recent examinations showed that it was wise to extend the course to three years. James T. Shinn, Treasurer of the College, spoke on the subject "The Faculty," and referred to many interesting reminiscences in speaking of those

who had held Professorships in the institution. J. H. Redsecker and M. N. Kline, in their usual happy manner, made entertaining and profitable remarks. Short addresses were made by the Faculty, students and some others who were present.

ALUMNI ASSOCIATION.

The thirty-fifth annual meeting of the Alumni Association was held in Alumni Hall on Monday afternoon, April 17th, with the President, James C. Perry, in the chair.

Following the annual address of the President, in which a number of recommendations were made relative to the interests of the Association, reports from the Treasurer and Secretary were read, the latter being to the effect that 122 new members had been enrolled, making an increase of 101 during the year. The number of deceased members reported for the same period was 21, making the total number of alumni 2,940. Reports were also received from the several standing committees of the Association.

After the reports had been considered, the election of officers for the ensuing year was held, and resulted as follows :

President, F. Wm. E. Stedem, '82; First Vice-President, Theo. Campbell, '93; Second Vice-President, Cornelius E. Spenceley, '78; Treasurer, Wm. Lincoln Cliffe, '84; Secretary, Wm. E. Krewson, '69; Corresponding Secretary, John H. Hahn, '81; Board of Directors, for three years, John D. Burg, '86; Frank P. Streep, '88; Fred. W. Haussmann, '90, and Walter A. Rumsey, '84; for unexpired term of Henry Trimble, deceased, Albert Oetinger, '86.

The thirty-fifth annual reception of the Association to the seventy-eighth graduating class was tendered on the evening of the same day in the College Museum. The music for the reception was furnished by McKinney's Orchestra.

Introductory remarks having been made by the President, James C. Perry, the Secretary, Wm. E. Krewson, called the roll of members elected during 1898-99.

An address to new members was then delivered by Mahlon N. Kline.

The several prizes offered by the Association were then presented as follows :

The Alumni gold medal to the member of the graduating class receiving the highest general average was awarded to Melvin William Bamford, the presentation being made by the President, James C. Perry.

The Alumni prize certificates to the members of the class receiving the highest averages in each of the branches were awarded as follows, Dr. A. W. Miller making the presentation :

Materia Medica, Charles Ellwood Rupert Smith, of Philadelphia.

Pharmacy, Richard Levis Fishburne, of Lock Haven, Pa.

Chemistry, Charles John Harvey, of Butler, Pa.

General Pharmacy, Alfred Heineberg, of Selma, Ala.

Operative Pharmacy, Melvin William Bamford, of Reading, Pa.

Analytical Chemistry, Peter Stang, of Philadelphia.

Pharmacognosy, William Stair Weakley, of York, Pa.

The Alumni silver medal for the best general average in the second year examination was awarded to Harry Lionel Meredith, of Hagerstown, Md., the presentation being made by F. W. E. Stedem.

The Alumni bronze medal was awarded to Lionel Gilliland Skillman, of

Philadelphia, for the best general average in the first year examination, and was presented by Theodore Campbell.

The class oration was delivered by Wm. Allen Chamberlin, of Indianapolis, Ind.; the poem by Robert Hoagland, of Peoria, Ill.; the history by Arthur Bowles Fleming, of Chambersburg, Pa.; and the prophecy by Christopher Koch, Jr., of Philadelphia, Pa.

EXAMINATION QUESTIONS.

The following is a copy of the questions given to the students of the third class at the recent examination. Those in operative pharmacy and analytical chemistry were practical and conducted in the respective laboratories; the others were written.

THEORY AND PRACTICE OF PHARMACY.

A—(1) How much quinine, strychnine and ferric phosphate would be required to make a litre of Tonic Elixir so that each teaspoonful would contain $\frac{1}{100}$ grain of Strychnine, 1 grain of Quinine and 2 grains of Ferric Phosphate? (2) How much of each ingredient would be required to make 10 wine gallons of the Tonic Elixir? (3) If Quinine cost 30 cents per ounce, Strychnine, \$1.50 per ounce, Ferric Phosphate, 80 cents per pound, and Simple Elixir, 30 cents per gallon, at what price would the 10 gallons of Elixir Tonic have to be sold, to net a profit of 30 per cent.—labor and any other expenses not being considered?

B—Give the unabbreviated official or Latin name, ingredients, brief outline of process, and describe the appearance of the following: Prussic Acid, Lugol's Solution, Labarraque's Solution, Solidified Copaiba, Basham's Mixture, Brown Mixture, Blaud's Pills and Cold Cream.

C—Give English name, ingredients, brief outline of process, and describe the appearance of the following: Liquor Plumbi Subacetatis, Liquor Acidi Arsenosi, Syrupus Tolutanus, Sapo Mollis, Tinctura Aconiti, Piluli Phosphori, and Unguentum Diachylon.

D—(1) What is Tincture of Deodorized Opium? (2) How is it prepared? (3) What are its uses and advantages? (4) How may preparations of opium be recognized by chemical tests? Give the color tests for the following: (5) Colchicine. (6) Strychnine. (7) Veratrine. (8) Brucine.

E—(1) How is Cod-Liver Oil prepared? (2) What are its medical properties? (3) What kinds are found in commerce? (4) State the precautions necessary in preserving the oil. (5) Name the usual impurities. (6) How is it best administered? (7) Write out a formula for the best method that you know of for giving Cod-Liver Oil.

F—(1) Name the parts composing a model prescription. (2) Write out a model prescription indicating each part. (3) How should unusual doses in prescriptions be designated? (4) Give five illustrations of faulty abbreviations in writing prescriptions, and state the reasons for avoiding such faults.

G—(1) How are "hard" and "soft" gelatin capsules containing oils made? (2) How are "pearls" made? (3) In filling empty capsules, how do you determine whether to use the ingredients in powder or mass? (4) What are the advantages and objections in using either the powder or mass form?

H—(1) What is the object of pharmaceutical legislation? (2) What is a Board of Pharmacy? (3) What are the duties of the members in your State? (4) What two classes of certificates are issued to licentiates? (5) Why is

there not a United States Pharmacy Law? (6) Why are there not more prosecutions in the various States for violating the statutes on adulteration?

J—Criticism and translate the following: Write out with English names the ingredients and quantities. State how you would compound them or what course you would pursue.

R	Tr. Cinchona Comp.	℥ iss
	Ext. Nux	℥ iii
	Tr. Gent. Comp. Qs ad.	℥ iv

R	Bromid Stronti	℥ v
	Carbu. Ligni Pulv.	℥ i
	Hayden's Vib. Co.	℥ ss
	Tinct. Ignat	℥ ij
	Essen Pepsin. ad	℥ ij

M. ft. Sol.

R	Bromalhydrat	5'0
	Hyoscyn. Hydrobr.	0'006
	Extr. Fab. Cal.	0'30
	Resin Gelsem.	1'0
	Acid Sclerotin	1'0
	Extr. Valer.	5'0

Qu. arab. q. S. ut. f. lege art Pil 50.

D. S. physicians use only.

K—Criticism and translate the following: Write out with English names the ingredients and quantities. State how you would compound them.

R	Quinin Sulph.	gr. lxxviii
	Liq. Potass.	℥ ss
	Elix. Calisaya q. s. ad.	℥ iv

R	Sodii Bicarb.	℥ iiss
	Potas. Sulphid	℥ ij
	Sodii Chlorid	℥ ss
	Pulv. Alumen	gr. x
	Aquæ	℥ iv

R	Syr. Senega.	f ℥ i
	Ext. Pruni Vir.	f ℥ i
	Vin Antimon.	f ℥ ss
	Ammon. Chlor.	℥ i
	Aqua font. q. s.	f ℥ iv

CHEMISTRY.

A—(1) Write the formula of official Alcohol and illustrate by reactions the action of sulphuric acid upon it under different conditions. What are the final products of these reactions? (2) Illustrate by reactions the several steps in the action of oxidizing agents upon Alcohol. Name the products of such action. (3) Illustrate by a reaction the action of a haloid acid upon Alcohol and name the product.

B—(1) Give the chemical formula of Formaldehyde and state how it is made. (2) What are some of the pharmaceutical, medical and technical uses of Formaldehyde? (3) By what tests would you show its presence in a liquid?

C—(1) What is the proper chemical name of Acetone? Describe it and state how it is made. (2) Write the reaction for the production of Chloroform from acetone. (3) What are the effects of oxidizing and reducing agents, respectively, upon Acetone?

D—(1) What is an Ester? Give the formula of an official Ester of an inorganic acid; of an organic acid. (2) What is meant by saponifying an Ester? Illustrate by a reaction, naming the products obtained. Name some official organic acids, both solid and liquid, which are obtained by the decomposition of naturally occurring Esters.

E—(1) Enumerate the several groups into which the class of carbohydrates is divided; give the distinctive reactions for each of these classes. (2) What is the formula of Dextrin? How is it made? How do you distinguish it, analytically, from starch? (3) State the several chemical reactions involved in the production of an alcoholic spirit from a cereal, like corn.

F—(1) State what isomers may be formed by the action of chlorine upon toluene and illustrate the difference by graphic formulas. (2) Write the reaction for the synthesis of Benzaldehyde, stating how it is carried out practically. (3) Write the formulas for Diphenylamine and Metaphenylenediamine, respectively.

G—(1) Write the graphic formulas of α - and β -Naphthol, respectively. (2) What nitrogenous basic substances are found corresponding in formulas to Benzene, Naphthalene and Anthracene, respectively. (3) Illustrate the correspondence by the graphic formulas of these substances.

H—(1) To what class of compounds does Oleum Terebinthinæ belong? (2) State the appearance and properties of the purified official preparation and of the crude material from which it is extracted. (3) State the chemical differences between Oleo-resins, Gum-resins and Balsams.

J—(1) Describe the general procedure in examining for alkaloidal poisoning. (2) What is a Ptomaine? To what class of chemical compounds do most of them belong?

K—(1) What salts of Mercury are poisonous? By what tests would you establish the fact of mercurial poisoning? (2) What is the antidote to be administered in case corrosive sublimate had been used? (3) What are the symptoms of chronic lead poisoning? What is the antidote for lead poisoning, whether acute or chronic?

MATERIA MEDICA.

A—Opium.—(1) Give the pharmacopœial definition of Opium. (2) From what tissue and part of the plant is Opium derived and how is it collected? (3) In what three forms is Opium official and what should be the morphine strength of each? (4) What peculiar acid is present, and what is the test for its presence? (5) State the maximum dose of morphine by the mouth, the rectum and hypodermically. (6) What effect has Opium upon the pupil of the eye and what are drugs called which act in this way? (7) Name a drug having an opposite effect upon the pupil and the class of drugs to which it belongs.

B—Coniferæ.—(1) Name two official oleoresins yielded by trees belonging

to this order. (2) State briefly the manner of their collection and describe their physical appearance. (3) Give the official name of the volatile oil obtained from one of them; also the official name of the residue left in the still. (4) Name the class of volatile oils to which this oil belongs and give its formula. (5) State the effect of this oil upon the kidneys and the bronchia when taken internally, and the effect upon the skin when taken externally.

C—Benzoinum.—(1) Give the name of the plant yielding Benzoin, its natural order and habitat. (2) What is the manner of its collection and by what three names are the different qualities known? (3) What two commercial varieties are seen in the market and what is the difference between them in color and odor? (4) Name its principal constituents. (5) Which of these can be prepared artificially from toluol or from hippuric acid? (6) When thus prepared how is it treated to give it the characteristic odor? (7) What are the medical properties of Benzoin and what action do the benzoates have upon alkaline urine?

D—Glucosides.—(1) Of what compounds is commercial Digitalin a mixture? (2) What is the dose of commercial Digitalin and of the crystallized Digitalin? (3) What effect has Digitalis upon the heart, arterial pressure and kidneys? (4) What diuretic glucosides are contained in many of the Ericaceæ? (5) Which of these is decomposed in the body into hydroquinone and what is the action of the latter? (6) Name the poisonous principle present in some of the Ericaceæ. (7) Name the poisonous neutral principle yielded by the flowers of *Artemisia pauciflora* and state its dose and action. (8) Why should it not be prescribed with an alkali?

E—Elaterium.—(1) Give the botanical origin, natural order and habitat of the plant from which it is obtained. (2) What is the manner of its production? (3) What amount of elaterium should it yield, and what is its best solvent? (4) What adulterations are sometimes present, and how may they be detected? (5) What is the dose of elaterin, and its action upon the gastro-intestinal tract?

F—Oleaceæ.—(1) Name the official drug yielded by *Fraxinus Ornus*, and state the manner of its production. (2) What are the commercial varieties? (3) What is its chief constituent, and what per cent. is present in the best varieties? (4) What are its medical properties and dose? (5) Name the drug obtained from *Olea Europæa*, and state the manner of its production. (6) Explain the changes which it undergoes in the intestinal tract previous to absorption.

G—Camphora.—(1) Give the name of the plant yielding official camphor, its natural order and habitat. (2) What is its official definition? (3) State briefly the manner of its production and method of refining. (4) What is its physical appearance, its behavior to solvents and how can it be powdered? (5) What allied product is obtained from Borneo? (6) State the dose of camphor and its effect upon the cerebrum.

H—Alkaloids.—(1) Name an alkaloid (and the leaf yielding it) which is a powerful sialogogue and diaphoretic. (2) Name the salt of this alkaloid which is official and its dose by the mouth and hypodermically. (3) Name an alkaloid (and the leaf yielding it) which is a local anesthetic. (4) Name an alkaloid derived from a seed of *Loganiaceæ* which is a powerful respiratory, cardiac and vaso-motor stimulant, and give its maximum dose. (5) Name three alkaloidal salts derived from a bark drug of *Rubiaceæ*, and state their medical properties. (6) Name three official salts derived from *Solanaceæ*, and state the dose of each.

J—Doses, etc.—State the best times and methods of administering the following, and the doses in which they should be given: (1) Castor Oil. (2) Croton Oil. (3) Cod-Liver Oil. (4) Potassium Permanganate. (5) Silver Oxide. (6) Pepsin. (7) Pancreatin. (8) Iodides. (9) Bismuth Salts (as gastric sedatives). (10) Sulphonal.

K—Botanical Names.—Give the botanical names of the plants yielding the following: (1) Thebaine. (2) Glycyrrhizin. (3) Kino-tannic Acid. (4) Arabic Acid. (5) Scammonin. (6) Mastichic Acid. (7) Styrol. (8) Guaiacic Acid. (9) Gambogic Acid. (10) Catechu-tannic Acid.

COMMITTEE.

A—(1) An apothecary has two lots of Powdered Opium of the respective morphine strengths of 11 per cent. and 15 per cent. How much of each must he take to make 5,000 c.c. of official Tincture of Opium, if he desires to use Powdered Opium of the average morphine strength of the Pharmacopœia? (2) How many c.c. of Camphorated Tincture of Opium would an equal weight of official Powdered Opium make? (3) About how much official Extract of Opium could be made from the same weight of Powdered Opium?

B—Iron.—(1) Give its Latin name and symbol. (2) In what forms is Iron found in nature? (3) What forms are officially used? (4) How many classes of compounds does Iron form? Give the valence of each. (5) How is Reduced Iron made? (6) How is Vallet's Mass made? (7) How is Solution of Ferric Chloride made?

C—(1) Write the official names of three important drugs of South American origin, and name an important medicinal constituent of each. (2) Name an official bitter-tonic drug that is destitute of tannin and whose fluid preparations, therefore, do not form a precipitate with ferric solutions. (3) Name two official barks distinguished from all others by being colored a deep-red by solution of one of the caustic alkalies. (4) Name three official root-drugs which are destitute of starch. (5) Write the official names of two root-drugs which yield pectin, and state how precipitation may be avoided in their galenical preparations.

D—Aconite.—(1) Give its official name. (2) Botanical origin. (3) Natural order. (4) Habitat. (5) Describe Aconite. (6) Name its official preparations and give brief outlines of the formula for each. (7) What is the active constituent of Aconite, and give its physical test. (8) Give the dose of the active constituent. (9) How would you treat poisoning by Aconite if compelled to act in an emergency?

E—(1) What is Tannin? (2) From what source is it usually obtained? (3) Give its official name. (4) What is its chemical relation to Gallic Acid? (5) What are the best solvents for Tannin? (6) How may Tannin be chemically identified? (7) What are the pharmaceutical difficulties in preserving galenical preparations of drugs containing Tannin? (8) Name ten official drugs containing Tannin in one or the other of its forms.

F—(1) Explain the theory of emulsification. (2) Describe the "English" and "Continental" methods of making emulsions. (3) How are emulsions made on a large scale? (4) How would you know when you had succeeded in making a good emulsion? (5) Why do such drugs as Myrrh, Asafetida, etc., not require acacia to make good emulsions? (6) What is Quillaja? How can

emulsions be made from its preparations? What are the objections to its use?

G—Pharmacognosy.—(1) What are the reserve materials in flaxseed? (2) In what part of the seed is the mucilage contained? (3) What per cent. of oil should ground flaxseed contain? (4) What microscopical test can be made to determine quickly if the oil has been removed? (5) Name a common adulterant of ground flaxseed.

*H—*Criticise and translate the following prescriptions, write out with names and ingredients with quantities, state whether you would compound them as written, whether chemical or other change or action occurs, if so, describe it, what course would you pursue on receiving them?

R	Sodii Salicylas.	℥i
	Quin Bisulph.	i gr. xx
	Syrup	
	Aq. Menth. q. s. ad.	f ℥iv
R	Sod. Salicyl.	℥i
	Phenazon.	℥ss
	Fiat Chart. No. xv	
R	Pulv. Opii.	gr. v
	Linoleum.	℥ ss
	Ext. Bellad.	gr. ij
	Ft. Unguent. sec. art.	

*I—*Give the English name, botanical name of the plant, natural order, habitat and active principles of the following drugs: Pareira, Capsicum, Hyoscyamus, Santonica and Melissa.

*K—*Criticize the following prescriptions, write out with English names, ingredients and quantities, state whether you would compound them as written, whether chemical change or action occurs, if so, describe it, what course would you pursue on receiving them?

R	Potas. Permang.	℥i
	Glycerin.	
	q. s. ft. mass et div. in pil. no. xx	
R	Potas Iodid.	℥ i
	Syr. Fer. Iod.	f ℥ ss
	Syr. Aurant Flor.	f ℥ iiiss
	Ft. Solutio.	
R	Acid Carbolic.	gr. xxv
	Sod. Bicarb.	
	Sod. Borat. āā	℥i.
	Glycerin.	f ℥ i
	Aqua ad.	f ℥ iv
	Ft. Solutio.	

The following specimens were placed before each of the members of the class for recognition:

Pharmacy.

- (1) Hydrargyrum cum creta,
- (2) Petrolatum molle,

Chemistry.

- (1) Aqua chlori,
- (2) Potassii bitartras,

- | | |
|------------------------------------|--------------------------|
| (3) Pulvis glycyrrhizæ compositus, | (3) Potassii nitras, |
| (4) Aqua amygdalæ amaræ, | (4) Potassii bicarbonas, |
| (5) Æther aceticus, | (5) Acidum boricum, |
| (6) Glycerinum, | (6) Alumen, |
| (7) Liminientum chloroformi, | (7) Potassii bromidum, |
| (8) Tinctura benzoini, | (8) Zinci acetas, |
| (9) Liquor ferri chloridi, | (9) Acidum tartaricum, |
| (10) Extractum cinchonæ fluidum. | (10) Acidum sulphurosum. |

Pharmacognosy.

- (1) Carthamus or safflower,
- (2) Belladonnæ folia,
- (3) Sarsaparilla (Honduras),
- (4) Strophanthus,
- (5) Rhamnus purshiana,
- (6) Granatum,
- (7) Digitalis,
- (8) Conium,
- (9) Belladonnæ radix,
- (10) Aconitum.

Committee.

- (1) Syrupus tolutanus,
- (2) Spiritus juniperi compositus,
- (3) Tinctura calumbæ,
- (4) Extractum sennæ fluidum,
- (5) Antimonii sulphidum,
- (6) Potassii chloras,
- (7) Ammonii chloridum,
- (8) Xanthoxylum,
- (9) Eriodictyon,
- (10) Cannabis Indica.

OPERATIVE PHARMACY.

(1) *Powders.*

- Cinchonine Sulphate 5 grammes.
 Glycyrrhiza Powd. 1 gramme.
 Mix; make 12 powders.

(2) *Troches.*

- Potassium Chlorate 6 grammes.
 Sugar, Powd. 24 "
 Tragacanth, Powd. 1'2 "
 Mix; make 20 troches.

(3) *Ointment.*

- Mercury 2'5 grammes.
 Nitric Acid 3 c.c.
 Nitric Acid 2 "
 Lard Oil 30 "
 Make Ointment of Mercuric Nitrate.

(4) *Suppositories.*

- Glycerin 8 c.c.
 Sodium Carbonate 0'50 "
 Stearic Acid 0'85 gramme.
 Make six suppositories and put them in a small, wide-mouth bottle.

(5) *Mixture.*

Make a mixture, secundem artem, containing 20 per cent. by volume each of tincture of Guaiac and Glycerin, and sufficient Water to make 120 c.c.
 Write a separate label, noting the contents of the bottle, and attach it.

QUANTITATIVE ANALYSIS.

Atomic Weights.—Ag 107.66, Br 79.76, C 12.01, Cl 35.46, H 1.0, K 39.10, N 14.01, Na 23.0, O 16.00, S 32.06.

A—(1) Give an outline of the gravimetric analysis of magnesium sulphate for magnesium oxide, sulphur trioxide and water of crystallization, mentioning the chemical formulas for the precipitates produced and for the substances weighed at the end. (2) Outline the calculations by which you would compute the percentage amount of each constituent found.

B—(1) Describe the gravimetric estimation of sodium hypophosphite which you made during this term. (2) Write equations for the reactions involved. (3) How many molecules of sodium hypophosphite are indicated by one molecule of the substance from whose weight the result was calculated?

C—(1) Show upon your paper the means which you take to find how much absolute acetic acid 1 c.c. of $\frac{N}{1}$ KOH, V. S. will neutralize. (2) 5.986 grammes

of a sample of acetic acid requires 36 c.c. of $\frac{N}{1}$ KOH, V. S. to neutralize it.

Explain why each c.c. of the V. S. used corresponds to 1 per cent. of absolute acetic acid. (3) How many grammes of absolute acid are present in one litre of the preceding sample, if the specific gravity of the liquid is 1.048?

(4) How many cubic centimetres of $\frac{N}{1}$ KOH, V. S. will be needed to neutralize 1 kilogramme of acetic acid containing 36 per cent. of the absolute acid? (5)

How many grammes of absolute acetic acid will this same volume of $\frac{N}{1}$ KOH,

V. S. neutralize? (6) A sample of acetic acid has a specific gravity of 1.048 and contains 36 per cent. of absolute acetic acid, how many cubic centimetres of the sample will be needed to neutralize 20 c.c. of $\frac{N}{1}$ KOH, V. S.?

D—Give the successive steps in the volumetric estimation of potassium bitartrate by means of $\frac{N}{1}$ oxalic acid, V. S., using phenolphthalein as indicator.

E—(1) How many grammes of pure $\text{Na}_2\text{S}_2\text{O}_5 \cdot 5\text{H}_2\text{O}$ are used to make one litre of $\frac{N}{10}$ V. S.? (2) Explain why this quantity is used. (3) What indicator is

employed with this V. S.? (4) Tell how the indicator behaves. (5) Name the four official substances which you estimated with this V. S. during the term. (6) Tell how each was prepared for titration. (7) Name an official substance in the estimation of which by residual titration you employed this V. S. (8) Name the other reagents employed in this same estimation.

F—A dry sample of potassium bromide contains potassium chloride. 0.500 gramme of the sample requires 43 c.c. of $\frac{N}{1}$ AgNO_3 , V. S. for complete precipitation, what per cent. of potassium chloride is present?

G—Give an outline of the official method of assaying opium, telling the uses of the materials, the substance weighed at the end of the process and showing the calculation of the result into percentage of the drug.

H—Describe the official method of estimating nitrites. (2) Explain the reactions involved in the estimation of spirit of nitrous ether. (3) Outline the calculations used in finding the percentage amount of the important constituent of this substance.

MINUTES OF THE PHARMACEUTICAL MEETING.

PHILADELPHIA, April 11, 1899.

The regular monthly Pharmaceutical Meeting was held in the Museum of the College, with David H. Ross in the chair.

There being no corrections, the minutes of the previous meeting were allowed to stand as published.

The presentation of papers next occupied the attention of the meeting, the first one being a short communication on "Syrup of Hydriodic Acid," by Edwin H. Wells, of Boston, which was read by Prof. F. G. Ryan. It was as follows:

"Much trouble with syrup of hydriodic acid has been experienced from the fact that, as ordinarily prepared, it is quite liable to become colored.

"This color has sometimes, doubtless, been due to liberation of iodine, but in the writer's experience, this is not always true, by any means.

"In most cases it seems to result from the action of the acid on impurities (coloring matter and ultramarine) contained in the sugar or on the sugar itself; the same difficulty being met with in other acid syrups, such as syrup calcium lactophosphate.

"Syrup hydriodic acid prepared from pure materials by the U.S.P. process, but using a light syrup (650 grammes to make 1 litre) made from pure white rock candy crystals, has been kept without change for months in partly filled bottles exposed to light and with occasional opening.

"Heat, however, causes the syrup to acquire color, and it should not, therefore, be kept in a warm place.

"When heavy syrup is employed, a white crystalline deposit sometimes occurs which does not appear when a thin syrup is used, but allowance must be made for the difference in percentage of acid by weight in the latter case.

"It seems to be mostly a question of purity of ingredients and syrup hydriodic acid carefully prepared from pure materials is perfectly colorless and limpid, and a permanent and satisfactory preparation."

In discussing this subject, Prof. Ryan thought that the most important statements of the author had been covered by Mr. F. W. Haussmann in a paper which appeared in the March issue of this JOURNAL, although he thought that every one would admit that the author's views were well taken.

Under the heading "Notes on Materia Medica," Prof. C. B. Lowe presented some criticisms on the 1890 U. S. Pharmacopœia. The author's remarks were confined to the official vegetable drugs and included suggestions for the more accurate description of some of these drugs, the dismissal of others on the ground of their being little used, and the admission of species which have here-

tofore not been recognized in giving the botanical origin of certain vegetable drugs.

Professor Ryan did not wholly accord with the author's remarks concerning the dismissal of Apocynum from the Pharmacopœia, and said that while the drug may be used very little in some localities, it is used to a considerable extent in Ohio and Indiana and some other States, and he, therefore, thought that a very broad view of the subject should be taken when discussing questions pertaining to the use of the drugs of the Pharmacopœia.

Prof. Joseph P. Remington was the next speaker and read a paper on "Syrupus Pruni Virginianæ (Acetous)" (see page 209). Samples of the syrup and of the fluid acetraet of wild cherry accompanied the paper.

Mr. Haussmann wished to know the object in directing 150 c.c. of glycerin in the official formula for this syrup, as he found it to keep very well with a less quantity of glycerin. Then, remarking on the quality of the wild cherry bark of the market, he said that he had experienced considerable difficulty in obtaining the drug of uniform quality and believed that the trouble was due to the bark having been collected in the spring and summer rather than in the fall of the year.

Prof. Remington in reply said that the use of glycerin had been two-fold—to hold the tannin in solution and to prevent precipitation. He believed that many of the fluid extracts and syrups of the Pharmacopœia would be improved by placing the glycerin in the receiving vessel rather than by adding it to the menstruum as now directed. The speaker then referred to the experiments of Professor Procter, in 1856, with the fluid extract of wild cherry and said that this preparation had always given more trouble than any of the other preparations of its class. He, therefore, suggested adding the glycerin to the bottle receiving the percolate, rather than to the menstruum, as a means of improving the fluid extract.

Prof. F. X. Moerk, having made assays of the dilute acetic acid infusion and of the aqueous infusion directed by the Pharmacopœia for the syrup of wild cherry, found that the percentage of hydrocyanic acid was about parallel in the two cases, or, if anything, slightly in favor of the acetic infusion, thus showing that the acetic acid had had no injurious effect.

F. W. Haussmann read a paper incorporating an improved formula for "Syrupus Rhei," which will be published in a subsequent issue of this JOURNAL.

Referring to the formula proposed by the author and to his suggestion to filter the mixture of fluid extract and water before dissolving the sugar in it, Mr. Geo. M. Beringer wished to know whether he had experienced any difficulty in filtering the mixture. In reply, Mr. Haussmann said that he had had no trouble with the official fluid extract, but that the same could not be said of the non-official product.

Mr. F. W. E. Stedem related an experience of his, which likewise showed that there is considerable variation in some, at least, of the fluid extracts on the market.

These remarks brought up the question of making infusions, syrups, etc., from fluid extracts. Professor Remington did not favor this practice, and to illustrate his view said that while fresh fluid extract of wild cherry contains the desired amount of hydrocyanic acid, an old fluid extract does not contain

any of the acid, or very little, and hence a syrup made from such a fluid extract does not possess the value that it otherwise would.

Mr. Beringer, while holding in part the same view, said that the practice of making other preparations from fluid extracts was very extensive. He said that syrup of tolu was made almost universally from the liquid tolu. To illustrate further, he said that a few years ago he started putting upon the market a line of fluid extracts without giving formulas for making syrups, etc. The demand for the formulas was so great, that in the end he was obliged to attach new labels, giving the desired formulas.

A note on "*Tinctura Opii Deodorata cum Camphoræ*," by Thos. S. Wiegand, was as follows: "The tonic effect of opium upon some individuals is as well known as its remedial effect upon the ordinary sufferer. And it is also true, in many instances, that paregoric is not injurious or annoying to persons who cannot take opium in any other form. In view of this fact, the following formula for an improved paregoric is presented:

Opii pulvis	3i
Ætheris	f 3 iv

"Macerate the opium two days in an ounce of the ether in a close vessel and then percolate with ether until the percolate is nearly colorless, and a few drops evaporated leave no opium odor; evaporate the percolate to $\frac{1}{2}$ fluid ounce, add to 1 pint of water and expose it to a gentle heat until all ethereal odor is removed; then dissolve in an ounce of alcohol: 1 drachm of benzoic acid and 1 drachm of oil of anise and 40 grains of camphor, to this add 12 fluid ounces of alcohol, mix with the aqueous solution of opium and then add alcohol sufficient to make 2 pints—permit it to stand twenty-four hours, with frequent shaking and filter."

A number of interesting specimens were exhibited, as follows: A sample of a new coca base termed by Dr. Schaefer, chemist of the New York Quinine and Chemical Works, "*cocainidine*." Mr. P. Samuel Stout, a student of the College, directed attention to quite a novelty in the way of a clothes-brush. The wood from which the brush was made was sawed from the trunk of a tree which is said to have stood in an ancient forest adjacent to what is now the northern limit of Chicago. This ancient forest is supposed to have been swept into an inland lake, which formerly occupied the present site of Chicago, by a powerful wind storm, and the lake having been filled by driftwood, sand, silt, etc., during the succeeding ages, the remains of the aforesaid forest were completely buried or hermetically sealed. There is evidence that this forest belonged to the vegetation which appeared soon after the glacial period, and so it is estimated that the wood from which the brush was made is 7,000 years old. The brush is the property of the Hon. Joseph M. Gazzam, of this city, and the wood from which it was made was collected by Mr. Ossian Guthrie, the eminent Chicago geologist.

Among the other specimens presented were several cocoanuts still in the partly green condition and attached to the branch on which they grew, which were grown in Jamaica, and were received from the India Refining Company, of this city. Mr. H. N. Rittenhouse presented some licorice root, grown in California, which was said to be quite rich in glycyrrhizin. Attention was directed to the flower of a calla, which showed a rather unusual development in that it possessed a double spathe. On motion, the meeting adjourned.

FLORENCE YAPLE, *Secretary pro tem.*

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HYDRASTINE HEXIODIDE, AND ASSAY OF HYDRASTIS CANADENSIS BY MEANS OF STANDARD IODINE FOR HYDRASTINE AND OF STANDARD POTASSIUM IODIDE FOR BERBERINE.

BY H. M. GORDIN AND A. B. PRESCOTT.

In the work of Research Committee D., Section II, Revision and Publication of the Pharmacopœia of the United States.

When a solution of iodine in potassium iodine is added to a solution of a salt of hydrastine a dense precipitate falls out, of a color varying from light brown to very dark brown. In this order of mixing the alkaloidal solution with the iodine solution, a mixture of different periodides seems to be formed, no matter whether the addition of iodine is stopped while the alkaloid is yet in excess or carried till the iodine is in excess. Even in the first case, that is, when the addition of iodine is stopped long before all the alkaloid is precipitated, the body formed only approaches a triiodide in composition, but does not correspond to a triiodide exactly. As will be seen from the accompanying analysis, the total iodine of the periodide formed under these circumstances agrees quite well with the theoretical amount required by hydrastine triiodide, but the additive iodine is considerably below the amount required by that body. It will be noticed that there is a decided difference in this respect between hydrastine, on the one hand, and strychnine, brucine and some other alkaloids on the other. The latter always form triiodides when iodine is added to an excess of a solution of their salt.¹

¹ *Proc. Am. Phar. Assoc.*, 1898, Vol. 46, p. 358. Abstract, this JOURNAL, Vol. 70, p. 439.

But if the order of mixing be reversed, that is, the weak alkaloidal solution added to a large excess of iodine, a definite and unique periodide, namely, hydrastine hydriodide pentiodide is always formed. This body is prepared according to the general method of making the higher alkaloidal periodides, described by us in the previous paper.¹ The hexiodide thus made is a very dark brown powder, very difficultly soluble in ether, benzol or cold chloroform, more readily in hot chloroform and in alcohol, and very easily in a mixture of alcohol and chloroform, or of alcohol and ether. In hot water it melts to a resinous mass. Attempts to crystallize it have failed, as on evaporation of the solvent it always remains a resinous mass.

Both in the hydrastine hexiodide and the lower compound, that approaching a triiodide in composition, the so-called additive iodine was estimated by dissolving the substance in a small quantity of a mixture of alcohol and chloroform, and titrating with standard sodium thiosulphate. For the estimation of total iodine in these compounds, the substance was treated with zinc and ammonia, the iodine then liberated by means of a solution of nitrous acid in concentrated sulphuric acid, and taken up with carbon disulphide. The details were carried out exactly as described in our paper on morphine tetraiodide.²

ANALYSIS OF THE HYDRASTINE HEXIODIDE.

For Additive Iodine.—0.1371 of substance were found to contain 0.075833 of additive iodine, and 0.1623 of substance 0.0898344 additive iodine.

	Found.	Calculated for $C_{21}H_{21}NO_6HI.I_5$
1	55.30	55.43
2	55.34	

For Total Iodine.—0.1491 substance contained 0.0996800 total iodine, and 0.1429 contained 0.0958333 total iodine.

	Found.	Calculated for $C_{21}H_{21}NO_6HI.I_5$
1	66.86	66.52
2	66.06	

¹ *Loc. cit.*

² *Proc. Am. Phar. Assoc.*, 1898, Vol. 46, p. 364.

ANALYSIS OF THE LOWER PERIODIDE OF HYDRASTINE, APPROACHING A TRIIODIDE.

For Total Iodine.—0.2674 contained 0.1337328 total iodine, and 0.2396 contained 0.1191752 total iodine.

	Found.	Calculated for $C_{21}H_{21}NO_6HI.I_2$
1	50.01	49.83
2	49.74	

For Additive Iodine.—0.09535 contained 0.0340975 free iodine, 0.1737 contained 0.0626681 free iodine 0.1215 contained, 0.0441395, and 0.2328 contained 0.0838545 free iodine.

	Found.	Calculated for $C_{21}H_{21}NO_6HI.I_2$
1	35.76	33.22
2	36.07	
3	36.33	
4	36.02	

In the iodometric estimation of hydrastine the exclusive formation of the hexiodide is assured by adding a weak solution of the alkaloidal salt to a large excess of iodine. The estimation is carried out in the same way as described by us in a previous paper.¹

The factor for hydrastine is 0.60403 :

$$(382.14 : 5 \times 126.53 :: 0.60403 : 1).$$

In order to test this factor, two solutions of hydrastine² in acidulated water were prepared, containing 0.3 per cent. and 0.15 per cent. of the free alkaloid respectively, and the estimation of the strength of the solutions carried out exactly as described in the above-mentioned paper. The results were as follows: 20 c.c. of the first (0.3 per cent.) solution consumed 0.0970001 gramme free iodine and 25 c.c. of the second (0.15 per cent.) solution consumed 0.0611461 free iodine.

STRENGTH OF THE SOLUTIONS.

	Found.	Actually contained.
1	0.29	0.30
2	0.14	0.15

¹ *Proc. Am. Phar. Assoc.*, 46, 368; *J. Am. Chem. Soc.*, 20, 722.

² We are indebted to Prof. John U. Lloyd, of Cincinnati, for a specially prepared sample of hydrastine. We had also a sample in a lot of pure alkaloids kindly furnished us by Merck & Co. These two samples agreed very well with each other in the quantitative results.

PLAN OF THE ASSAY OF HYDRASTIS CANADENSIS.

The estimation of hydrastine and berberine in this root is based upon the following principles:

(1) Hydrastine is quite soluble in absolute ether, and forms, as we have just shown, a definite hexiodide when a weak solution of any of its salts is added to a large excess of iodine dissolved in a potassium iodide solution.

(2) Berberine, on the contrary, is completely insoluble in absolute ether. This can be shown by rubbing up some pure berberine in a mortar with absolute ether, filtering, evaporating the ether and taking up with acidulated water. The liquid thus obtained is perfectly colorless, and no trace of turbidity is produced in it by Mayer's reagent, Wagner's reagent or picric acid, nor does chlorine water produce the characteristic rose band.

(3) Of all the difficultly soluble berberine salts, the hydriodide seems to be the least soluble, particularly so in a very large excess of potassium iodide. If to a solution of berberine in water slightly acidulated with acetic or sulphuric acid a large excess of a potassium iodide solution be added, the precipitation is so complete that the filtrate is almost entirely colorless, and no alkaloid can be detected in it by any of the above-mentioned reagents. Even chlorine water, reacting with a delicacy said to be 1 in 250,000, does not give any coloration, after removal of potassium iodide from the filtrate by silver nitrate, and of the excess of the latter by hydrochloric acid.

(4) If to a very dilute solution of a salt of pure berberine about ten to fifteen times its amount of acetone be added and the solution then made strongly alkaline with solution of sodium hydrate, berberine-acetone is so fully precipitated, particularly after ten or fifteen minutes' shaking, that the filtrate is almost completely colorless, and no traces of alkaloid can be detected in it after acidulation, by means of the above-mentioned reagents.¹ This berberine-acetone

¹ Besides berberine and hydrastine, one other alkaloid has been found in hydrastis, but in proportions too small to have any bearing upon the assay percentages, either of berberine or hydrastine. That the assay process here proposed leaves no appreciable quantity of any alkaloid behind, we have verified by operating upon a considerable quantity of the drug. After removing the hydrastine with the ether, and the berberine with potassium iodide, there was nothing left that gave indications of alkaloidal character. What has been learned of canadine makes it probable that it would adhere to berberine or to

is easily decomposed by boiling with mineral acids, with the liberation of pure berberine.

hydrastine. In the elaborate research which has established the existence of canadine, Prof. E. Schmidt (1894: *Arch. d. Pharm.*, 232, 136) prepared it from a crude hydrastine, and also from a crude canadine hydrochloride made for him by E. Merck, of Darmstadt. In the purification the canadine was precipitated as a salt of nitric acid. The insolubility of its salts with mineral acids would be likely to carry it into the crude salts of berberine, when these are precipitated for the removal of this alkaloid. Prof. J. U. Lloyd ("Drugs and Medicines of North America," Cincinnati, 1885, pp. 139-141, 127) has shown that strong acidulation with hydrochloric acid is necessary to the full precipitation of the berberine, and that when the filtrate is precipitated by ammonia at the neutral point any further precipitation caused by an excess of the ammonia consists of or contains berberine, as a result of its incomplete removal by acid precipitation. Professor Lloyd was evidently right in his conclusion that the method of Burt (1875: *AM. J. PHARM.*, 47, 481) for "a third alkaloid" yields berberine unless this have been more closely removed by the strong acidulation just referred to. But since the research of Schmidt it appears likely that canadine would be precipitated with the berberine by strong acidulation. And the discrepant accounts of the color of the third alkaloid are explained by the discovery that, though it is colorless, in purity, it acquires color by exposure to light and air, tetrahydroberberine ($C_{20}H_{21}NO_4$) being oxidized into berberine itself ($C_{20}H_{17}NO_4$) (Schmidt, *Arch. d. Pharm.*, 232, 148). However, neither Hale nor Burt worked with enough of the hydrastis to obtain canadine in the purity and amount required for any satisfactory description or conclusion. They did not claim to individualize or name the alkaloid; indeed, the note of Hale only raised the question of its existence. Professor Schmidt, who had, as he said, worked more than ten years with hydrastis alkaloids, found it needful to operate upon 50 kilograms of the drug, and availed himself of a crude product accumulated in a manufactory. This was about five years after that Wilhelm had made a report from the laboratory of Professor Schmidt (1888: *Arch. d. Pharm.*, 226, 320) upon a third alkaloid in hydrastis. In this report the finding of this alkaloid was ascribed to Hale (1873: *AM. J. PHARM.*, 45, 247), Burt (*loc. cit.*) and Lerchen (1878: *AM. J. PHARM.*, 50, 470), and the reader might infer that the name canadine had been proposed by Hale and Burt. Consequently, in the second edition of "Beilstein" (III, 491) "canadine" is described upon no other authority than that of Hale and of Burt. In Beilstein's third edition, with fuller description, the authority of E. Schmidt, Privatmitth, is prefixed. The alkaloid examined by Wilhelm in 1888, not analyzed because of insufficient quantity, was prepared from ammoniacal solution extracted with acetic ether. That observed by Hale, by Burt and by Lerchen was obtained by precipitation with ammonia in some excess. The first elementary analysis was made by L. Deichmann (Inauguraldissert, Rostock, 1892). In the analysis of Schmidt his figures differ from those of Deichmann, due to greater purity of preparation (*Arch. d. Pharm.*, 232, 139). Deichmann reported a cryoscopic determination of the molecular weight. Zeisel (Inauguraldissert, Dorpat, 1892) determined the methoxy groups in canadine.—A. B. PRESCOTT.

These statements about berberine are true only when the berberine is perfectly pure, such as can be obtained from berberine-acetone, according to the directions of Gaze,¹ and dried in the air without heat. Commercial salts of berberine, and particularly commercial berberine itself, is generally so impure that some of these reactions will not hold good.²

Basing ourselves upon these facts, we have worked out a method of assaying *Hydrastis canadensis*, the plan being as follows: The alkaloids of the powdered root are first set free by the action of an ethereo-ammoniacal mixture consisting of stronger ammonia water, 5 c.c.; alcohol, 5 c.c., and ether, 30 c.c.³ After drying the powder is extracted with absolute ether, and the ethereal extract, after evaporation of the ether and taking up the residue with acidulated water, is used for the estimation of hydrastine by any suitable method. Through the powdered root left in the extraction apparatus air is passed till it is dry, and then the powder is extracted with alcohol to exhaustion. The alcoholic extract, after dilution with water, evaporation of the alcohol and taking up the residue with diluted acetic acid, is used for the estimation of berberine. The berberine is first precipitated as berberine acetone, the latter washed, decomposed by the aid of acid, and the purified berberine estimated by standard solutions of potassium iodide, silver nitrate and ammonium sulphocyanate.

DIRECTIONS FOR THE ASSAY.

Ten grammes of the finely powdered hydrastis are rubbed up to a paste with a few cubic centimetres of the above-mentioned ethereo-ammoniacal mixture in an 8-ounce screw-top ointment jar, and a few cubic centimetres more of the same mixture are then added so as to have the powder well covered with liquid. The small pestle is then left inside and the jar well covered is set aside over night. The jar is then opened, put into a good current of air till the odor

¹ The compound of berberine with acetone was first made by Gaze, *Arch. d. Pharm.*, 1890, 607.

² *Loc. Cit.*

³ This is the same mixture we have used in our general method of extracting alkaloids (*J. Am. Chem. Soc.*, 1899, 232), with the omission of chloroform. The latter gives with berberine a compound not decomposable with acids (E. Schmidt, *Pharm. Ztg.*, 1889, 542).

of ammonia has disappeared, and then in a vacuum over sulphuric acid for about five or six hours. The powder is then put into a filter paper cell, placed in a Soxhlet extraction apparatus, the jar rinsed out several times with powdered glass, or, in the absence of this, with coarsely powdered barium nitrate, the rinsings added to the Soxhlet, the latter connected with an Erlenmeyer flask containing about 40 or 50 c.c. absolute ether, and the extraction conducted in the usual way, till a few drops after evaporation of the ether and acidulation give no reaction with Mayer's or Wagner's reagent. The ethereal extract will be found to have only a very slight yellow color. The Erlenmeyer is then detached from the Soxhlet, the ether poured out into a flat evaporating dish, the Erlenmeyer washed out several times with water containing about 2 per cent. sulphuric acid, the washings added to the contents of the evaporating dish, and the latter put into a draught at about 30° C., till the ether has disappeared.

The contents of the dish are poured into a 100 c.c. flask, the dish washed, the washings added in the flask and the latter filled up to the 100 c.c. mark. The solution containing hydrastine sulphate, and of which every 10 c.c. represent 1 gramme of the root, is used for the estimation of hydrastine.

For the iodometric estimation 20 c.c. of the filtered solution (representing 2 grammes of the drug) are run from a burette into a 100 c.c. flask containing 20 or 30 c.c. of a standardized solution of iodine of any known strength (that in the neighborhood of 1 per cent. is the best) and the analysis carried out exactly as described in our previous paper.¹ From the amount of iodine consumed the amount of hydrastine is deduced by using the factor of the hydrastine hexiodide, *i. e.* 0.60403 of hydrastine for one of iodine consumed.

For a gravimetric estimation another portion of 20 c.c. of the filtered solution is run into a separator and the hydrastine shaken out with benzol and ammonia, all the coloring matter remaining in the aqueous fluid, and a perfectly colorless solution of hydrastine in benzol is obtained. The benzol solution is then filtered through a small filter into another separator, the first separator and filter washed with benzol and the hydrastine again shaken out with water acidulated with sulphuric acid. At last, from the watery solution

¹ *Proc. Am. Phar. Assoc.*, 46, 368; *J. Am. Chem. Soc.*, 1898, 722.

the hydrastine is shaken out with ether and ammonia, the ether poured into a tared beaker and slowly evaporated in a dark place. After drying in vacuum over sulphuric acid and paraffine the beaker is weighed. The hydrastine is left in perfectly white crystals, and only a slightly yellowish tint can be seen on the sides of the beaker. This tint is probably due to traces of canadine, which becomes yellow¹ on exposure to light. Of course, instead of shaking out, the method of perforation may be used if preferred.

For the estimation of berberine a current of dry air is passed through the Soxhlet till all the ether is removed, the Soxhlet connected with an Erlenmeyer containing 40 or 50 c.c. of alcohol, and the extraction continued till the alcohol comes out colorless. The alcoholic extract containing the berberine, and considerable quantities of extractive matter, is poured out into an evaporating dish, the Erlenmeyer washed out with hot water and a little dilute acetic acid, the washings added to the evaporating dish, and the latter kept on a water-bath, adding water from time to time till all the alcohol has disappeared. A little more diluted acetic acid is now added, the dish covered, and when completely cold its contents are filtered into an Erlenmeyer having the capacity of about 300 or 400 c.c.²

Six to 8 c.c. of acetone are added to the contents of the Erlenmeyer, to which the washings of the dish and the filter have been added, and then a 10 per cent. solution of sodium hydrate is added, drop by drop, till the precipitate first formed ceases to disappear on shaking, and the liquid acquires a strongly alkaline reaction. The Erlenmeyer is then stoppered and shaken in circular direction for about ten or fifteen minutes, and then set aside in a cool place for two or three hours. The berberine-acetone separates out in crystals, some of which adhere to the sides of the vessel. The supernatant

¹ E. Schmidt, 1894: *Arch. d. Pharm.*, 232, 141.

² In the remaining procedure, the simplest way would be to precipitate the berberine with hydrochloric or nitric acid, but in this case a considerable amount of extractive matter contaminates the precipitate, and the estimation would fall out too high, though the error in this respect might be compensated to some extent by the solubility of the hydrochloride or nitrate in water. But the best way is to purify the berberine by converting it into berberine-acetone, regenerate the alkaloid by means of sulphuric acid, and then estimate it volumetrically by standard potassium iodide.

liquid is then poured on a small filter, the precipitate washed once or twice by decantation, and then on the filter till the washings are colorless. The filter is then pierced through, and by means of the spritz bottle, the precipitate is returned to the same Erlenmeyer in which the precipitation took place. In this way all loss is avoided. To the precipitate about 4 or 5 c.c. of a 5 per cent. solution of sulphuric acid is now added, and then water enough to make about 100 or 200 c.c. The Erlenmeyer is now put into hot water when the precipitate will completely dissolve in the course of a few minutes. The solution is now poured out into a long-necked flask, washing the Erlenmeyer several times, the flask put on an asbestos plate and kept very gently boiling for about an hour and a half or two hours, adding hot water from time to time if necessary.

The flask is now cooled and its contents poured out into a litre measuring flask,¹ into which there has been previously taken from a burette 100 c.c. of twentieth normal potassium iodide. The flask is washed several times, the washings added to the measuring flask and the latter filled up to 1,000 c.c. and set aside over night. 500 c.c. are now filtered off into another litre flask 50 c.c. of twentieth normal silver nitrate, and nitric acid added to the flask, which is filled up to 1,000 c.c., well shaken, filtered and 500 c.c. of the filtered liquid titrated back with fortieth normal ammonium sulphocyanate, using ferric alum as indicator. Twice the number of cubic centimetres of the sulphocyanate solution used is equal to the number of cubic centimetres of the potassium iodide solution consumed by the berberine, representing 10 grammes of the hydrastis root. By multiplying the number of cubic centimetres of twentieth normal potassium iodide consumed by 0.167125, the percentage of anhydrous berberine in the root is obtained, as 1 c.c. of the potassium iodide solution is equal to 0.0167125 of berberine.

In our assay of *Hydrastis canadensis* three samples of powdered hydrastis were treated in the way described. The berberine was estimated volumetrically, the hydrastine both iodometrically and gravimetrically.

¹ The berberine hydriodide being extremely bulky, the error arising from the space occupied by the precipitate is reduced to a minimum by using a large flask.

FOR HYDRASTINE.

	Iodine consumed by 2 grammes of the root.	Hydrastine.	
		Iodometric.	Gravimetric.
1	0'0760015	2'29	2'29
2	0'0772012	2'33	2'30
3	0'0777770	2'35	2'28

FOR BERBERINE.

	Number of c.c. of $\frac{N}{20}$ KI consumed by 10 grammes of the root.	Berberine, anhydrous.
1	15'1	2'52
2	15'3	2'55
3	14'8	2'47

With regard to the precipitation of berberine by potassium iodide, we wish to draw attention to the fact that even a solution of the free alkaloid without any addition of acid is precipitated by potassium iodide. As there is no acid to combine with the potassium, the question is what becomes of the metal when the iodine of the potassium iodide is taken up by the berberine? That there is no potassium in the precipitated berberine hydriodide was proven by igniting the precipitate with sulphuric acid and ammonium nitrate, when no trace of residue was to be found. All the potassium must then pass into the filtrate and part of it must exist there as a salt of something acting as an acid, as there is no trace of alkalinity in the filtrate. No one of the indicators gives an alkaline reaction. We acidulated the filtrate with sulphuric acid, shook it up with ether, washed the ether till there was no reaction given for iodine by sodium nitrite and starch, nor for sulphates by barium chloride, and evaporated the ether to dryness; a very small amount of a crystalline substance was left, which would seem to indicate the presence of an organic acid. But the quantity was too small for a closer examination. We intend to take a larger quantity of pure berberine into operation and investigate the subject thoroughly in the near future.

UNIVERSITY OF MICHIGAN, April, 1899.

SYRUPUS RHEI.

BY F. W. HAUSSMANN.

Every revision of the United States Pharmacopœia within the last three decades witnessed a radical change from the previous formula in syrup of rhubarb.

To the delight of the operator, who believes in easy and rapid methods, irrespective of appearance of the finished preparation; the edition of 1870 directed simple mixture of fluid extract and syrup.

The unsightly preparation produced thereby still lives in the memory of older pharmacists.

A radical deviation from this rapid process is found in the edition of 1880, the syrup being directed to be prepared from ground rhubarb and cinnamon, the extraction of active principles being aided by the addition of potassium carbonate.

The objections to this process are chiefly based upon the extraction of mucilaginous and other inert principles, which impair the stability of the syrup, while being utterly without value.

The British Pharmacopœia directs a similar process and objections of English pharmacists on account of the instability of the syrup are frequently published.

The present United States Pharmacopœia returns in a measure to the process of 1870, simply diluting the fluid extract with syrup, but retains the cinnamon in the form of spirit and also the potassium carbonate.

Several objections may be made to the syrup thus prepared.

The too diluted condition of the syrup is the first, the cloudy syrup being too thin and easily fermenting in warm weather.

The presence of alcohol in the fluid extract as well as addition of glycerin to the syrup do not prevent decomposition.

Another objection is furnished by the precipitation of a reddish-brown compound on standing.

This appears to consist of mucilaginous principles, and is apparently the factor which induces fermentation.

Improvement of the official syrup rests, therefore, upon the above points, increase of density and removal of inert principles.

After a number of trials, the following simple modification of the present process was found to furnish an improved syrup.

The greater stability will recompense for the increase in time necessary for completion.

Samples prepared by the writer over a year ago and exposed to the temperature of the past summer give no evidence of precipitation or decomposition.

SYRUPUS RHEI. SYRUP OF RHUBARB.

Fluid extract of rhubarb	100 c.c.
Spirit of cinnamon	4 "
Potassium carbonate	10 grammes.
Sugar	750 "
Water, a sufficient quantity to make	1000 c.c.

Mix the spirit of cinnamon with the fluid extract of rhubarb and add 375 c.c. of water, in which the potassium carbonate was previously dissolved.

Allow the mixture to stand for two hours, with occasional agitation.

Filter, and when the liquid has drained, pass a sufficient quantity of water through the filter to bring the measure to 475 c.c.

In this dissolve the sugar by agitation without heat and strain. Finally, add a sufficient quantity of water to make the syrup measure 1,000 c.c.

SOME NEW PREPARATIONS OF CALENDULA.

BY GEORGE M. BERINGER.

Although calendula is official, it has not received very extensive use. Nor do the dispensaries look upon marigold as possessing any special remedial value, the tincture being referred to as "probably of as much value as simple alcohol."

The drug has, however, met with more favor in homeopathy, and several preparations are quite popular. Recent indications point to the fact that physicians of the old school are beginning to test it.

The fluid extract and tincture are the preparations heretofore used, and the latter is displacing tincture of arnica for local application. In dental practice it is likewise displacing tincture of myrrh and seems to be preferable for a mouth-wash.

The florets carefully dried and finely pulverized have been used as an absorbent and healing application to chafed surfaces, and

one physician informed the writer that he preferred it to iodoform as a dusting-powder for slight wounds and abrasions.

Calendula Ointment.—The following formula yields a preparation very similar to that sold by the homeopathic pharmacists:

Take of—

Petrolatum	85 grammes.
Yellow wax	5 "
Paraffin	5 "
Fluid extract of calendula	5 c.c.

Melt the wax, paraffin and petrolatum, add the fluid extract gradually and stir till cold.

Calendula Oil.—What is called calendula oil, or more correctly calendulated oil, is a soothing application to catarrhal surfaces, and is obtaining favorable notice and use among specialists in treatment of throat and nose as a final spray or dressing after the treatment with an aqueous liquid such as Seiler's solution.

The following formula is submitted:

Take of—

Contused calendula	100 grammes.
Alcohol	75 c.c.
Ammonia water	2 "
Pure olive oil	1000 grammes.

Mix the alcohol and ammonia water and moisten the drug therewith. Then place it in a can or suitable container, add the olive oil and macerate for three or four days at a temperature of 60° to 70° C. with frequent agitation. Then express and filter.

Calendulated Collodion.—At the request of a physician friend, I have also prepared a calendulated collodion to be used as a substitute for isinglass plaster and adhesive plaster.

The following is the formula:

Calendula in No. 20 powder	100 grammes.
Alcohol, a sufficient quantity.	
Castor oil	20 "
Ether	700 "
Pyroxylon	20 "

Percolate the calendula with alcohol until 200 c.c. of percolate is obtained. To this add the ether, and to the mixture add the pyroxylon and dissolve, and finally the castor oil and sufficient alcohol to make 1,000 c.c. and set aside for a few days to clear.

A CLASSIFICATION OF GUMS, RESINS AND SIMILAR SUBSTANCES.

BY FREDERICK L. LEWTON.

The terms, "gums," "resins," and "similar substances," as here used, include only those plant exudations and prepared substances of similar appearance, which are popularly or commercially known as gums, resins, balsams or rubbers.

It will be at once readily seen that the above definition excludes pectic substances and numerous gums, resins and mucilages occurring in small amounts in the tissues of many plants, which should find a place in a complete scientific classification of resinous and gummy substances.

The classification of gums, resins and similar substances, particularly those included by the commercial world under the general name of "gums," presents a number of difficulties which probably account for the want of uniformity among the different systems of classification that have been proposed from time to time. This want of uniformity is no doubt due to the fact that the majority of these substances are complicated bodies, bearing no general relationship as regards chemical affinities, and are widely distributed in the vegetable kingdom, originating therefrom in several ways.

Some are secretion products, others have been clearly proved to be formed from the walls of plant cells by chemical metamorphosis, and others again are inspissated saps or extracts.

The following classification is based chiefly on physical properties and chemical composition and divides these substances into nine sections, each of which may be divided into a number of sub-sections.

SECTION I. TRUE GUMS.

Plant exudations, or prepared vegetable substances, which dissolve or soften in cold water, forming a mucilage, or at least a liquid of a gelatinous consistency.

They are insoluble in 60 per cent. alcohol. Treated with nitric acid, they yield mucic and oxalic acids. Sulphuric acid converts them into dextrin and finally into sugar.

They may be divided into five sub-sections according to their chemical composition.

Sub-section 1. Arabic Group.—These gums consist chiefly of

arabin. They are almost entirely soluble in cold water, forming a mucilage.

Examples: All kinds of Acacia gums, mesquite, Féronia, or wood-apple, Buchanania and acajou gums.

Sub-section 2. Cherry Group.—These gums consist chiefly of cerasin, and swell in cold water, forming a poor mucilage.

Examples: Cherry, peach and apple-tree gums.

Sub-section 3. Tragacanth Group.—The gums comprising this group consist chiefly of bassorin, and swell in cold water, forming a mucilage.

Examples: Tragacanth, kuteera, nopal, Moringa and cocoanut gums.

Sub-section 4. Dextrin Group.—The representation of this group consists of almost pure dextrin. It is soluble in cold water, forming a thick viscous solution which has strong adhesive properties.

Examples: Dextrin, British gum or gommeline.

Sub-section 5. Seaweed Group.—The representative of this group consists chiefly of gelose. It forms a jelly with 500 times its weight of water.

Example: Japan isinglass from *Gelidium corneum*.

SECTION II. TRUE RESINS.

Hard, friable, lustrous, vegetable substances, externally resembling gums, but which neither dissolve nor soften in cold water. They burn with a bright smoky flame, contain much carbon, but little oxygen and no nitrogen.

Resins are not definite chemical compounds, but are complicated mixtures of the resin acids. They may be divided into six groups.

Sub-section 1. Copal Group.—These resins are insoluble in ordinary solvents unless fused.

Examples: Amber, animi or Zanzibar copal, Angola, Sierra Leone, pebble, and other East and West African copals.

Sub-section 2. Dammar Group.—The resins comprising this group are more or less soluble in ether, chloroform, benzol, acetone, oil of turpentine etc., and are almost entirely insoluble in alcohol.

Examples: Singapore and Batavian dammars, Kauri or Australian dammar, and American copal or courbaril resin.

Sub-section 3. Sandarac Group.—These resins are more or less soluble in alcohol without warming.

Examples: Sandarac, mastic, Manila copal, the black, white and sal dammars of India, and guaiacum resin.

Sub-section 4. Colophony Group.—These resins are obtained in the distillation of crude turpentine or other oleo-resins, or they may be natural products which have lost their volatile oil through evaporation. They are entirely soluble in alcohol.

Examples: Common resin or colophony.

Sub-section 5. Benzoin Group.—The resins of this group are soluble in alcohol and contain benzoic or cinnamic acids or yield them when subjected to heat.

Examples: Benzoin, dragon's-blood from the East Indies, yellow and red grass-tree gums or acaroid resin.

Sub-section 6. Lac Group.—This group includes the resinous incrustation, as well as the purified products obtained therefrom, which is found on the twigs of many species of trees, and is elaborated from the sap by the female of the lac insect (*Coccus lacca*). They are partially soluble in alcohol, forming a turbid solution.

Examples: Stick lac, seed lac, shellac, button and garnet lac.

SECTION III. INODOROUS GUM-RESINS.

Plant exudations, having no pronounced odor, and which consist essentially of gum and resin associated together in various proportions, sometimes accompanied by waxy matters. They form an emulsion with water and contain no volatile oil.

Examples: Gamboge, South American hog-gum.

SECTION IV. ODOROUS GUM-RESINS.

Plant exudations, composed of mixtures of gum, resin and volatile oil in varying proportions. They have a distinctive odor, which may be foetid or fragrant in character.

Sub-section 1. Asafoetida Group.—This group includes gum-resins having a fetid or more or less disagreeable odor. The most important of them are yielded by plants belonging to the order Umbelliferae.

Examples: Asafoetida, galbanum, ammoniacum, opopanax and "cumbi" or Gardenia resin.

Sub-section 2. Myrrh Group.—These are gum-resins having a more or less fragrant odor. The majority of them are yielded by plants belonging to the order Burseraceae.

Examples: Myrrh, bdellium, olibanum and "gomart" resin.

SECTION V. OLEO-RESINS.

Plant exudations consisting of resin mixed with volatile oil in various proportions; the resin frequently being dissolved in the latter, forming a liquid.

Sub-section 1. Lacquer Group.—This group includes the natural varnishes and desiccating lacquers, which have the property of drying hard with considerable lustre. They are mainly yielded by trees belonging to the order Anacardiaceæ.

Examples: Chinese, Japanese, Burmese and Indian lacquers and cardol.

Sub-section 2. Copaiba Group.—These are fragrant liquids, usually classed with the balsams, but which differ from them in consisting of a comparatively small amount of resin dissolved in volatile oil.

Examples: Copaiba balsam and gurjun balsam or "wood-oil."

Sub-section 3. Turpentine Group.—This group includes the soft resins containing more or less volatile oil, which are exuded by the cone-bearing trees.

Examples: Crude turpentine, Canada balsam, "gum thus," galipot, etc.

Sub-section 4. Elemi Group.—These are soft resins, seldom containing more than 10 per cent. of volatile oil. They are mainly yielded by trees belonging to the order Burseraceæ.

Example: Manila and Brazilian elemi, Mexican "copal," Caraña resin and tacamahac.

SECTION VI. TRUE BALSAMS.

Plant exudations consisting of resin mixed with aromatic acids, alcohols and esters.

Examples: Liquid storax, "Sweet-gum" resin, or liquidambar, balsam of Peru, and balsam of tolu.

SECTION VII. VOLATILE OILS.

Sub-section 1. Camphor Group.—These consist of solid oxidized hydrocarbons.

Examples: Camphor, borneol, menthol crystals.

Sub-section 2. Terpene Group.—It comprises liquid hydrocarbons.

Examples: Wood-tar, tar and rosin oils, spirits of turpentine, etc.

The majority of the essential oils are of the same composition but they are not classed with the gums and resins.

SECTION VIII. MILKY SAPS.

(Not included in above sections.)

Sub-section 1. Rubber Group.—These consist chiefly of hydrocarbons, known as polyterpenes.

Examples: Rubber, gutta-percha, balata and chicle.

Sub-section 2. Opium Group.—They consist chiefly of gum and resin, associated with alkaloids, acids, inorganic salts, etc.

Examples: Opium, lactucarium, scammony and euphorbium.

SECTION IX. INSPISSATED SAPS AND EXTRACTS.

Plant exudations or inspissated saps, consisting of gum or resin, or both, associated with astringent and bitter principles, alkaloids, glucosides, etc.; or inspissated extracts of similar composition.

Sub-section 1. Kino Group.—These are plant exudations containing tannins.

Examples: Malabar, Bengal and Australian kinos, West Indian dragon's blood and Mochras or silk-cotton gum.

Sub-section 2. Hemp Group.—A plant exudation, containing resin, inorganic salts, etc.

Example: Charas.

Sub-section 3. Aloe Group.—They are inspissated saps, containing resin, bitter principles, etc.

Examples: Barbadoes, Socotrine, Cape and other kinds of aloes.

Sub-section 4. Extract Group.—This includes all inspissated extracts containing alkaloids, glucosides or tannins.

Examples: Gambir, cutch or catechu, quebracho, licorice paste, curare, etc.

PHILADELPHIA MUSEUMS.

RECENT LITERATURE RELATING TO PHARMACY.

THE ACTION OF AN ACETYLENE GAS-FLAME ON PLATINUM.

Iltyd J. Redwood devised a Bunsen burner to use with acetylene gas. After applying the flame to a platinum crucible a short time, it was discovered that the vessel had gained in weight, and the bottom very much resembled newly galvanized iron. The crucible was

then carefully watched, but no change was noted until one day after about two hours' heating, an examination showed that it had a somewhat spongy appearance, and a number of small cracks extended through the metal, while two or three small beads hung on the outside. Calcium oxalate was being ignited.—1898, *Four. Soc. Chem. Ind.*, 17, 1107. L. F. KEBLER.

CONSTANTS OF AMERICAN LINSEED OIL.

A. H. Gill and A. C. Lamb have analyzed a number of samples of genuine linseed oil, with the following results:

Brand.	Specific Gravity at 15.5° C.	Valenta Test, ° C.	Maumene Test, ° C.	Iodine Absorption in Per Cent. in 4 hours.	Iodine Absorption in Per Cent. in 16 Hours.	Drying Test, Hours Required.
1 Western raw	0.933	79	97	174.7	180	72
2 Western raw	0.932	70	90	169.7	180	72
3 Western raw, special . . .	0.934	73	105	178.0	178	72
4 Old Calcutta	0.931	71.5	106	167.5	178	72
5 Eastern oil	0.931	73	105	168.0	168	72
6 Western boiled	0.936	74	100	178.8	178.8	18
7 Eastern boiled	0.938	59.5	101	169.5	171	18
8 Acid bleached	0.934	52.5	103	160.0	160	84
9 Bleached without acid . .	0.932	60	105	162.0	162	84
10 Menhaden oil	0.934	73.5	135	157.0	181	84
Usual constants	0.931-0.937	57-74	103-126	—	170-188	—
Average	0.934	—	111	—	176	—

Menhaden oil, No. 10, was examined because it is used as a substitute for, and adulterant of, linseed oil.—1899, *Four. Am. Chem. Soc.*, 21, 29. L. F. K.

DETECTION OF CITRIC ACID.

Deniges (*Fourn. de Pharm. et Chimie*, 1898, 487) presents a method of estimation of minute quantities of citric acid even when mixed with tartaric. He adds to 5 c.c. of a 2 per cent. solution of the suspected body 1 c.c. of 2 per cent. permanganate solution and

heats until the mixture is brown and gas bubbles are evolved. The mixture is then removed from the flame and allowed to stand until colorless, whereupon 1 c.c. of solution of mercuric sulphate (red mercuric oxide, 5 grammes; concentrated sulphuric acid, 20 c.c.; water, 100 c.c.) is added and the liquid boiled. If citric acid be present (even 0.5 per cent.) a white cloudiness or precipitate occurs.

H. V. ARNY.

MICROSCOPIC EXAMINATION OF WHEAT FLOUR.

E. Collin (*Rep. Pharm.*, 1898, 438, from *Jour. Pharm. et Chimie*) has given wheat flour and its adulterants a careful study. The article begins with an elaborate description of the histology of the fruit of wheat, and then compares its flour with that of likely organic adulterants—rye, rice, corn and barley. The characteristics of wheat flour are the size and shape of the starch granules and the shape of the lumen of wheat hairs chancing to be present—the latter differing from those found in *rye* by being flat at the base.

The aleuron masses found in wheat flour are apt to be mistaken for *rice* starch, but the iodine test will distinguish the two substances.

Rye starch is about the same size and shape as the average wheat starch granule, and this fact makes rye the best adulterant of flour. Lucas, however, claims that from a flour mixed with rye, the yield of gluten is always lessened, citing that a wheat flour, from which 24.6 per cent. of gluten was obtained, on adulteration, with 6 per cent. of rye, yielded only 22.8 per cent. gluten, and after 10 per cent. of rye had been added, the gluten yield was but 20.4 per cent. The article emphasizes these statements without special particulars.

Rice starch can be easily detected in flour by the different form and size of the granules, those of rice measuring not more than 8 microns, while the wheat granules are usually 28 to 35 microns. The rice starch can be easily separated from the wheat starch by kneading the flour under a stream of water (whereby the gluten is obtained), and allowing the wash water to settle, which it does in three layers, the lowest containing the wheat starch, and the central one, the wheat integuments and the rice starch. Other suggested adulterants are sawdust (distinguished by the peculiar markings of the walls of the wood cells), mildew (caused by careless handling of the flour) and darnel.

H. V. A.

THE CONSTITUENTS OF HAMAMELIS BARK.

F. Grüttner publishes (*Archiv. d. Pharm.*, 1898, 278) a lengthy thesis on witch hazel bark, that is a model of skill and care. Passing over minutiae, the salient points of the investigation are that the bark contains:

(1) Fat, chiefly an ester of a monatomic alcohol, identical with physosterin, and oleic and palmitic acids.

(2) Gallic acid, proven an actual constituent of the unmodified bark.

(3) Tannins consisting of crystalline and amorphous forms of a body having formula, $C_{14}H_{14}O_5$, with varying amount of water. These two bodies, which he calls hamamelitannin, are dextrogyre, possess five hydroxyl groups and one carboxyl, form definite benzoyl derivatives and hydrolyse to gallic acid. There is also a tannin hydrolysing to glucose and gallic acid.

(4) Sugar (see Cheney, *A. J. P.*, 1886, 417), which yields, with phenyl hydrazin, an osazone of formula, $C_6H_{10}O_4(N_2HC_6H_5)_2$, hence a glucose.
H. V. A.

ELDER JUICE IN ERGOT EXTRACT.

Cepellini (*Boll. Chimico-farm.*, 1898, 263, from *Sud-deutsch. Apoth. Zeit.*) notes that extract of ergot, found in Italian commerce, is adulterated with elder juice. It can be detected by dissolving 1 gramme of the suspected extract in 30 drops sulphuric acid diluted with 6 c.c. water, adding 10 c.c. oil turpentine, shaking well, allowing to stand and passing through a filter moistened with turpentine. The filtrate should separate in two layers—the turpentine layer being colorless and the lower layer the color of malaga wine. Should the upper layer be green-yellow and the lower bright red, elder juice is present.
H. V. A.

BISMUTH TESTS.

H. Thoms (*Suddeutsch., Apoth. Zeit.*, 2898, 376) recommends the following quantitative test of bismuth subnitrate:

At red heat it should give off yellow fumes and leave a residue of bismuth oxide amounting to 79 to 80.5 per cent. original weight (instead of 79–82 per cent., as at present).

Two grammes shaken in a 100 c.c. flask with a little water, 10 c.c. normal potassium hydrate added and the mixture allowed to stand

a few minutes, with occasional agitation; after filling flask to 100 c.c. mark with water, should require for neutralization of 50 c.c. of the decanted and clear liquid, not less than 2.1 c.c., nor more than 2.4 c.c. normal hydrochloric acid, phenolphthalein being the indicator.

Each cubic centimeter of normal alkali employed in abstracting the acid radicle from the subnitrate (represented by difference between amount employed and amount shown on titration) is equivalent to 0.054 grammes N_2O_5 . The figures given above indicate 14 to 15.6 per cent. N_2O_5 , which the author's examination show to be the average standard.

O. Spindler (*loc. cit.*, 1898, 375) finds the volumetric estimation of the subnitrate, as outlined above, usually defective, as most normal potassium hydrate contains carbonate. He heats to boiling a mixture of about 2 grammes subnitrate with a little water, and 25 c.c. normal alkali, whereby bismuth hydrate is produced. After cooling, the mixture is neutralized with normal hydrochloric acid, after which 10 c.c. titrated, 25 per cent. acid is added, when the bismuth goes into solution as chloride, then 10 c.c. normal ammonium chloride solution (5.35 grammes to 100 c.c.) is added and the solution neutralized with normal alkali, when bismuth oxychloride precipitates.

The mixture is then transferred from the 200 c.c. flask heretofore used, to one holding 500 c.c., and water is added to bring the mixture to the latter volume. It is then filtered and 10 c.c. of the filtrate is titrated with $\frac{1}{10}$ normal silver nitrate.

The quantity of bismuth is calculated by subtracting the amount of $\frac{1}{10}$ normal silver nitrate, required for 500 c.c. of the filtrate, from the amounts of all the $\frac{1}{10}$ normal hydrochloric acid and $\frac{1}{10}$ normal ammonium chloride employed. The difference will represent the amount of $\frac{1}{10}$ normal silver nitrate required for the chlorine in the precipitated bismuth oxychloride, and this figure, in cubic centimeters, multiplied by the factor 0.02595, will give the actual amount of oxychloride through which the bismuth strength of the subnitrate can be estimated.

MALIC ACID OF THE CRASSULACEÆ.

There has been much discussion as to identity of the malic acid obtained from plants of N.O. Crassulacæ.

Braconnet, its discoverer, thought it identical with the usual malic

acid (obtained from unripe apples, mountain ash berries, etc.). Mayer, however, found it different, and this was confirmed by Schmidt. However, the two authors disagreed on a very important point, Mayer finding the Crassulaceæ acid polarized to the right (the ordinary acid is lævogyre), while Schmidt found it rotated to the left. Lastly, Aubert found it identical with the ordinary acid.

J. H. Aherson (*Ber. d. Deutsch. Chem. Ges.*, 1898, 1432) has taken up the problem, and finds the Crassulaceæ acid is different from the ordinary acid, and is strikingly analogous to d-lactic acid, being dextrogyre, but forming a lævogyre anhydride in concentrated solution, a lactid, on heating, and salts that are lævogyre.

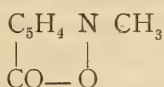
He, therefore, concludes it is a stereoisomere of the ordinary acid, the relationship between the two being analogous to that existing between d- and e-tartaric acids. He notes, however, that Bremer has made a dextrogyre malic acid by reduction of d-tartaric acid, and states that this is not identical with the acid from the Crassulaceæ.

H. V. A.

CONSTITUENTS OF STROPHANTHUS.

The work of the past year has increased our knowledge of strophanthus, two contributions being particularly noteworthy.

H. Thoms (*Ber. d. Deutsch. Chem. Ges.*, 1898, 271) reports that the drug contains, besides strophanthin, choline and trigonelline—a base found in fenugreek, having the formula



F. Feist (*Ber. d. D. Chem. Ges.*, 1898, 535) investigated strophanthin and finds it nitrogen-free and without reducing action on Fehling's solution. It has the formula $\text{C}_{32}\text{H}_{48}\text{O}_{16}$, and hydrolyses to two forms of sugar and to strophanthidin, $\text{C}_{26}\text{H}_{38}\text{O}_7 + \frac{1}{2}\text{H}_2\text{O}$, which oxidizes to benzoic acid (from *Schweiz. Wochenschrift für Chem. und Pharm.*, 1898, 323).

H. V. A.

VOLATILE OIL FROM HOPS.

This oil, prepared by distillation of hops with steam, has been studied by A. C. Chapman (*Fourn. Fed. Inst. Brewing*, 1898, 224).

Its specific gravity varies from 0.8743 to 0.8802, it is dextrogyre, neutral, sulphur-free, scarcely soluble in water and sparingly in 93 per cent. alcohol.

DECOLORIZING REDDENED CARBOLIC WATER.

H. Barth (*Schweiz. Wochenschr. für Chem. und Pharm.*, 1898, 581) recites the inconvenience of reddened carbolic acid and the comparative uselessness of suggested remedies. He finds that the color can be removed from a 5 per cent. solution by means of common wool (Berlin zephyr). Three grammes of this placed in a litre of the solution of phenol removes all trace of color, becoming dyed itself. Unfortunately, this simple remedy does not avail with 95 per cent. acid.

H. V. A.

A NEW BISMUTH REACTION.

Pollacci (*Ph. Post*, 1898, 509) finds that bismuth compounds, in the presence of bromine, or moistened with concentrated hydrochloric acid, give a green flame differing from that of copper, boron or thallium, by being pure green below, blue-green above and blue-white at the tip.

H. V. A.

DETECTION OF EXCESS OF SOLANINE IN POTATOES.

Schnell (*Ap. Zt.*, 1898, 775) reports a wholesale poisoning case at the Strasburg garrison, which was traced to potatoes furnished as food. These potatoes assayed 0.24 pro mille solanine, when cooked, and 0.38 pro mille when raw; whereas normal potatoes contain only 0.06 to 0.064 pro mille. Examination showed small dots (evidently fungi) on the sliced potatoes, and it was found that the spotted portions assayed on an average one-third more solanine than the healthy portions; hence the author concludes that the fungi influences the development of solanine and urges the rejection of any potatoes bearing gray spots on the interior.

H. V. A.

A NEW ADULTERANT OF OIL OF ROSE.

Dietz (*Suddentsch. Ap. Zt.*, 1898, 672) received from his Bulgarian agent a sample of a new mixture utilized as adulterant by the oil producers of that section.

It is of the consistency of ointment at 15°, and is not a trans-

parent liquid until warmed to 42°. When cooled to 20°, it deposits crystals more regular in shape than the stearopten of oil of rose.

The difference between the adulterant and oil of rose is as follows :

The adulterant has higher specific gravity (0.950 at 15°; rose, 0.870); higher optical rotary power (— 40° at 15° C.; rose, — 2°); higher melting-point (42° C.; rose, — 25° C.); smaller saponification number (2.1; rose, 10 to 20); and leaves on evaporation a resinous mass (16.2 per cent.; rose, none).

In a second article, the writer admits the adulterant identical with that reported by Schimmel & Co., namely, guaiac-wood oil.

H. V. A.

STROPHANTHIN IN OLEANDER.

The oleander of Algeria exudes, from incisions in the old branches, a milk juice that is poisonous. From this dried juice, powdered and mixed with its own weight of chalk, Dubigadoux and Durieu (*J. de Pharm. et de Chim.*, 1898, 433) extracted with 95 per cent. alcohol a white substance, which chemical and physiological tests proved identical with strophanthin.

H. V. A.

CAUSE OF BLACKENING OF BEAN PODS.

In the west of France, the inhabitants prepare a bean soup, in which they include the green pods, and the product is blackish, rather than green. Noticing that the pod of the fully developed fruit is also black, Bourquelot and Hérissé (*Journ. de Pharm. et de Chim.*, 1898, 385) investigated the cause.

The first step was the maceration—pod, seed-integument and embryo—in separate portions of 95 per cent. alcohol, and each expressed liquid was treated with the highly oxidizing aqueous extract of the mushroom, *Russula delica*. The only liquid affected was the extract of the pods, which quickly changed to red and then to black. The expressed residues from the alcoholic extraction were treated with boiling water, the expressed infusions saturated with chloroform and each divided into two parts; one of which was allowed to stand with access of air just as it was, while to the other was added some of the *Russula* extract.

As with the alcoholic extracts, the only ones affected were the two from the pods; that containing *Russula* being of a deep black, while the other was scarcely lighter.

This led the investigators to believe the pods of the bean con-

tain two forms of chromogene—one oxidizing to black under the influence of *Russula* extract; the other under simple influence of air—and a search for the bodies was started.

A 95 per cent. alcoholic extract of 500 grammes green pods was evaporated to 30 c.c., and to this was added 25 c.c. absolute alcohol. This caused the separation of a mass of crystals, which, after careful washing, was subjected to chemical and microscopical examination and proved to be tyrosin.

Tyrosin solutions blacken under the influence of *Russula* extract, but not on simple exposure to air; so the authors conclude that the blackening of the soup is due to a ferment not yet isolated.

From the filtrate from the tyrosin crystals, the writers separated leucin and asparagin; but whether these play any role in the blackening process is not clear.

H. V. A.

MEDICATED GAUZES.

Turinski (*Zeitschr. der allg. Oest. Ap. Verein*, 1898, 842) discusses Schacherl's article on medicated gauze (see this JOURNAL, 1899, 89), calling attention to a general error in estimating percentage on the weight of the gauze alone, without reference to the liquid serving as "fixer."

He shows that a so-called 10 per cent. iodoform gauze—containing 18 grammes to 180 grammes dry gauze—usually contains 32 grammes glycerin and that the amount of iodoform representing a true 10 per cent. would be 23.555 grammes. He gives several such examples, all prepared by himself, unfortunately without proving such method prevails in the manufacture of commercial gauzes. In making gauzes he finds 95 per cent. alcohol the best saturating medium. Regarding "fixers," he states that such are wholly unnecessary, when the antiseptic is soluble in alcohol or present in minute quantities. For insoluble bodies, like iodoform, they are essential, and he recommends, after much experimentation, glycerin.

H. V. A.

OIL OF CADE.

In searching oil of cade for the terpene, cadinene, Troeger and Feldmann (*Arch. d. Pharm.*, 1898, 692) found it present only in small quantities; the chief constituent of the oil appearing to be a sesquiterpene, which was optically inactive and boiled at 250°–260° C.

H. V. A.

PHARMACOLOGICAL NOTES.

✓ THE MYDRIATIC ALKALOIDS.¹

BY A. PINNER.²

Perhaps no set of drugs and active principles has been subjected to more thoroughgoing chemical and experimental investigation than those having a mydriatic influence over the pupil. As a result, many obscure points as to their composition and action have been cleared up, and the bewildering multiplicity of names for all the different solanaceous alkaloids has been reduced to a few of rather more definite meaning. Recently, however, some of the older alkaloids have been resurrected and their virtues extolled under new names (hyoscin under the new name of scopolamin for instance), giving rise to much confusion in the minds of those who cannot be in intimate touch with the latest advance in the organic chemistry of the Solanaceæ. Since 1833, when Phillip Geiger announced that, along with Dr. Hesse, he had succeeded in obtaining from some domestic poisonous plants the alkaloids atropine, hyoscyamine and daturine, down to the present day there have not only been numerous additions to this alkaloidal family, but there has continued a more or less animated discussion as to the properties of the several principles, and the identity of a number of them. Among the many alkaloids, acids and bases that have been derived from the mydriatic plants may be mentioned atropin, tropin, atropic acid, tropic acid, hyoscin, hyosci acid, duboisin, homatropin (synthetic) oxytropin, scopolamin, scopolin, oscin, and atroscin, and chemists and pharmacologists are so far from agreement as to the properties of these different principles that their chemistry is by no means complete or clear. One stands bewildered at the multiplicity and interchangeability of the various bases and salts, and yet this chaos would have been of little concern to the pharmaceutical or medical world had not hyoscin hydrobromat been made official in the third edition of the German Pharmacopœia, and then been changed to scopolamin by the influence of E. Schmidt in the 1895 supplement to the same.

¹ Translated by Wendell Reber, Ph.G., M.D., Instructor in Diseases of the Eye in the Philadelphia Polyclinic and College for Graduates in Medicine, with a note by the translator on the pharmacologic identity of hyoscin and scopolamin.

² From the *Centralblatt für praktische Augenheilkunde*, January, 1898.

However, the following statements may be said to fairly represent the present status of our knowledge concerning the chemistry of this alkaloidal family:

(1) The different members of the Solanaceæ, namely, *Atropa*, *Hyoscyamus*, *Datura*, *Mandragora*, *Solanum* and *Anisodus*, contain two principal alkaloids, one of the composition $C_{17}H_{23}NO_3$, the other of the composition $C_{17}H_{21}NO_4$; so that the second may be viewed as an oxidation product of the first.

(2) The first mentioned is *hyoscyamin*, which is easily converted by alkalies into atropin. While the latter principle may exist, as such, in small quantities in the above mentioned species, it is altogether possible that hyoscyamin is the form the alkaloid takes in the living plant, while atropin is the form in which it appears in the dead plant.

(3) The second base is *hyoscin*, or what amounts to the same thing—*scopolamin*. It would appear that in the presence of alkalies hyoscin undergoes a change similar to that of hyoscyamin, and it then becomes inactive¹ scopolamin or atroscin.

(4) Further, hyoscyamin and atropin, by separation of a molecule of water, become apo-atropin or atropamin, which is isomeric with belladonnin.

(5) Hyoscin, whose hydrobromat is official, is derived principally from the root of *Scopolia atropoides*, and contains in addition to hyoscin (which dilates the pupil) inactive¹ atroscin (which does not), and traces of hyoscyamin and atropin.

(6) Finally, there is present in duboisin not only hyoscyamin, but also hyoscin and other alkaloids that are as yet little understood.

TRANSLATOR'S NOTE.

The spirited controversy that has been waged the past few years over the chemical identity or non-identity of hyoscin and scopolamin cannot but be more or less misleading to the pharmaceutical and medical student. And for this reason, if for no other, it may be just as well for the translator to state that—for once—the chemists may be left to themselves. In this particular instance, pharma-

¹ I construe the word "inactive," as here used by the author, to mean that the drug is without influence over the pupil of the eye.—W. R.

cology furnishes a verdict from which there can be no reasonable appeal. The fact is that the eye reacts in like manner to both these principles. The two essential ocular phenomena which all this alkaloidal group produce in varying degree, are dilatation of the pupil and paralysis of the small muscle within the eyeball, whose function it is to accommodate the focus of the eye for the particular distance at which it may be working at any given moment. This little circular muscular band is known as the muscle of accommodation (or ciliary muscle). The paralyzing action of the mydriatics on the muscle of accommodation is shown by the temporary loss of all ability to read, sew or do any other fine work at from 10 to 20 inches distance for a period varying from one hour to ten days from the time of using the drug. Now, it is principally in their power to paralyze this muscle that the solanaceous alkaloids differ from each other.

As to hyoscin and scopolamin, it remains to be said that there is the closest conformity in the mode, rapidity, duration and disappearance of their action upon the healthy human eye.

Assuming the use in each eye of two drops (half an hour apart) of a $\frac{1}{2}$ per cent. solution of hyoscin hydrobromat or scopolamin hydrobromat, in either case :

Dilatation of the pupil will begin in about ten minutes and reach its maximum in about 50 minutes.

The (ciliary) muscle of accommodation will begin to lose its power and the patient's vision for near objects begin to fail in about thirty minutes; it will be entirely lost in about one hour, will remain so for four to six hours, and will then gradually return and be completely re-established in about fifty-five to sixty hours. These figures are the result of my own experiments with the two drugs on a human eye that was as close an approach to mathematical perfection as we find anywhere in Nature, and my own findings are substantiated in the main by those of Schmidt, E. Merck, Meyer and E. Emmert. Therefore, while we cannot say as yet that hyoscin and scopolamin are *chemically* identical, there is not one point lacking in the pharmacologic evidence to show that for all practical purposes of pharmacist and physician they are identical of effect (pharmacologically identical), and, therefore, entirely interchangeable. And while substitution is not only the violation of a sacred trust between the druggist and the physician, but is ethically

a high crime and misdemeanor, this would seem to be an instance where the substitution of hyoscin hydrobromat for scopolamin hydrobromat, or vice versa, would be entirely justified by the facts.

PHARMACOLOGY OF ACONITINE.

C. R. Marshall in the *Medical Chronicle* for May, 1898, publishes an interesting abstract of a valuable paper by Cash (J. T.) and Dunstan (W. R.) appearing in abstract in the *Proceedings of the Royal Society*, Vol. LXII, on the pharmacology of aconitine and some of its derivatives, considered in relation to their chemical constitution.

"The substances investigated physiologically were aconine, $C_{24}H_{39}NO_{10}$; benzaconine, $C_{24}H_{38}(C_6H_5CO)NO_{10}$; acetyl-benzaconine (aconitine), $C_{24}H_{37}(CH_3CO)(C_6H_5CO)NO_{10}$; and diacetyl-aconitine, $C_{24}H_{35}(CH_3CO)_2(C_6H_5CO)NO_{10}$. In all cases the hydrobromide of the alkaloid was used. Their effects were studied on (1) the blood-pressure, pulse and respiration of anæsthetized cats; (2) the temperature, respiration, etc., of rabbits and guinea-pigs; (3) the circulation, reflexes, cutaneous sensibility, etc., of frogs, and (4) their lethal doses on various animals. As an example of the last, the effects on cats will suffice. In these animals the toxic doses per kilo body-weight are: aconitine, 0.000134 gramme; diacetyl-aconitine, 0.004 gramme; benzaconine, 0.0245 gramme; aconine, 0.166—0.4 gramme.

Introduced into the circulation, "aconitine at first stimulates medullary centres, slowing the heart; acceleration follows, auricles and ventricles taking up an irregular and (at one stage of toxic action) independent rhythm. Imperfect systole (especially in the ventricles) develops. Irritability of ventricular wall is much increased. Extensive variations of blood-pressure accompany the preceding phenomena. After great ventricular acceleration, with very imperfect systole, delirium of the ventricles supervenes. The vagus (stimulated) continues to restrain speed of contraction (especially acting upon the auricle), and may favor closer sequence of ventricular upon auricular systole, so as to cause a rise in blood-pressure. For the same reason, during a stage of sequence, it may cause the usual effect—fall of pressure. In slow poisoning the cardiac vagus, on stimulation, ceases to produce any effect.

Diacetyl-aconitine produces similar though less marked effects. Benzaconine causes depression of the cardiac motor apparatus,

a greater fall of blood-pressure, and a blocking of auricular impulses to the ventricle producing a rhythm, which is largely reversed to that of aconitine. Digitalin is said to be "the most effective antagonist towards benzaconine." Aconine, compared with the three compounds considered, is relatively harmless to the heart; it even shows an antagonistic effect towards aconitine and diacetyl-aconitine.

As regards the respiration, "aconitine at first stimulates the respiratory centre and the sensory vagal fibres in the lung. Depression rapidly follows, death in mammals being due to cerebral respiratory failure." Diacetyl-aconitine produces less initial stimulation, and benzaconine depresses both the respiratory centre and pulmonary vagus from the first. Aconine slows the respiration from its action on the centre, and produces a curare-like action on the motor nerve endings in the respiratory muscles.

The cerebro-spinal centres and sensory nerves seem to be stimulated by aconitine at first, and afterwards depressed. After large doses loss of consciousness sometimes occurs. Diacetyl-aconitine produces a similar, though less marked effect. The motor nerve-terminations also seem to be depressed by this drug. Benzaconine depresses the cerebro-spinal centres, but it exerts no effect on sensory nerves, except in deep poisoning. Aconine has comparatively little effect; its chief action is a curare-like effect on motor nerve-endings.

The effect on the temperature was almost parallel with their effect on the heart and respiration; aconitine is the most active (half-lethal dose causes a fall of about 2° C.); aconine the least.

It would therefore appear that the addition of two acetyl groups to an aconitine molecule merely exerts a weakening effect, but that the withdrawal of the acetyl radicle forming part of the aconitine molecule results in a complete change in physiological action. Similarly, the loss of a benzoyl radicle from benzaconine produces a transformation in its physiological effect. Instead of, for example, depressing the heart, aconine acts as a slight tonic to it. Both benzaconine and aconine are to some extent antagonistic to aconitine, the latter possessing the most marked effect in this direction. This is of interest in connection with the fact that both of these substances occur in the plant from which our medicinal preparations are made.

EDITORIAL.

BOTANICAL NOMENCLATURE.

The nomenclature question is one that botanists are thinking about seriously. Probably all investigators are coming to agree with the writer in the *Botanical Gazette*, 1896, p. 338, who says: "To any one who has had experience with the numberless unexpected and complicated problems which a settlement of the subject must dispose of, if it is to be a settlement at all, it is apparent that a great deal of preliminary work must be done in the way of testing the application of the various rules suggested, so that those who are to decide upon them may do so intelligently, and in ascertaining just what are the defects to be remedied, and what are the disturbing elements in our present nomenclature, so that the settlement may reach all of them."

Dr. Theodore Gill, in his vice-presidential address before the A. A. A. S., in 1896, concludes that "the best thing to do now is to accept the current system, purified as much as possible by judicious and inexorably applied laws. Doubtless, in the distant future, a less cumbersome and changeable system of notation will be devised, but in the meantime we had best put up with the present, inconvenient though it may be." There is apparently a desire among recent writers on botanical subjects in America to fall in line and follow the rules adopted in 1892 by the Botanical Club of the A. A. A. S. Mr. C. G. Lloyd, in his recent pamphlet, No. 3, on "Mycological Notes," appends a note on "Nomenclature," in which he gives his reasons for not following these rules. He says:

"I have noticed several criticisms of my failure to give the names of authorities after the names of plants, and these criticisms are not unexpected. I have only to say concerning the subject that the omissions are made with design. I see no more reason why one who describes a plant should attach his name to it and cumber the pages of literature for all time with it than should one who discovers a new star, a new element, a new chemical compound, a new shade of color or a new anything else. It is necessary that the object should have a name, but it does not follow that it should be entangled for all time to come in print of every description with the name of its namer.

"The personality of the man who chanced to stumble over it or who first described it, is neither useful nor necessary. We all appreciate the great, and I believe to a large extent unnecessary, useless weight our study carries in the form of synonyms, and know that several sets of rules have been evolved to govern the naming of plants. The trouble is botanists are not agreed on any set of 'rules' nor in my opinion can any be formulated that will remedy the matter, until botanists become scientists to the exclusion of their personalities. I therefore advocate the taking away of the main *inducement* (as I see the matter) to make synonyms. There is no question but that many writers are fond of seeing their names after a plant. Is it not a standing 'reward' offered the searcher after 'new species,' and a strong temptation to make 'new species' on very slight differences? Let us omit the personality after the name of a plant and use it only in connection with the bibliographical citation after *synonyms*, and I believe that authors will be less free to propose new names unless they feel pretty sure of their ground."

It may be interesting, in the light of Mr. Lloyd's note, to reprint the remarks

of Prof. H. H. Rusby, in the *Alumni Journal*, some years ago, on the "Results of Following the Rule of Priority in Plant Names." He says it is "not true, as invariably stated by the disputants upon the other side, that the object or result of observing priority is to increase synonymy. Upon the other hand, the first object in view by most of those who advocate it, is to prevent such increase, and it is safe to say that but for this object the proposition would find but a small following. Present synonymy is, as stated by the above writer, 'appalling,' resulting in their now being some 700,000 names for 200,000 plants, but it has nearly all resulted from a failure to observe the rule of priority. If such a result has occurred in the past, a continuance of the cause will continue to augment the result. The enforcement of the rule of priority, while it will undoubtedly result in a sharp increase in the number of synonyms for the immediate present, will almost entirely cut short their multiplication in the future. For this conclusion we are not obliged to depend upon speculation, as we have a perfect precedent in the experience of the zoologists. The success attained in this direction by the workers in that branch of science is one of the most frequent and powerful arguments used by those who favor priority, yet we do not remember to have ever seen any reference made to it by those who argue upon the other side.

"But this is not the only, nor the most important result hoped for from the rigid enforcement of the rule of priority. If, for example, the 'Index Kewensis' had been based upon such a rule it would unquestionably have paved the way for the intelligent use of plant names, without the necessity of appending the name of the author, a practice which in the present state of affairs would make botanical writings in this department largely unintelligible. It is, of course, impossible to ever annihilate a synonym once made. It must continue to be in existence as long as it remains in print. But there is a way to practically annihilate it by rendering it inoperative. If, therefore, the ideas of the advocates of priority are to be fairly interpreted it must be said, not that they aim to add fifty thousand, or any other number of synonyms to encumber the ground, but that they hope to remove therefrom all synonyms, and to leave each plant with but one recognized name. For the statement quoted above, this should be substituted: 'They would remove 500,000 synonyms.' It is because it is believed that this result can never come from any half-way measures that the rigid enforcement of the rules is insisted upon. That the most rigid following of the rule of priority is to prevail in the United States there appears not the least doubt, and we fully expect to see our botanical names written in the near future without the use of the author's name, reference being made to the list officially printed as indicating the sense in which such names are used."

This subject is one fraught with interest and one upon which all botanists are seriously thinking. We hope to give more personal consideration to the matter at some future time.

REVIEWS AND BIBLIOGRAPHICAL NOTICES.

A MANUAL OF ORGANIC MATERIA MEDICA, being a guide to materia medica of the vegetable and animal kingdoms, for the use of students, druggists and physicians. By John M. Maisch, Ph.M., Ph.D., late Professor of Materia

Medica and Botany in the Philadelphia College of Pharmacy. Seventh edition. Revised by Henry C. C. Maisch, Ph.G., Ph.D., Professor of Materia Medica and Botany in the Medico-Chirurgical College of Philadelphia, Department of Pharmacy. Philadelphia: Lea Bros. & Co. 1899. Pp. 523.

A close acquaintance with this work for a decade and a half of years, has made it seem like a valued friend whose face we are always glad to see.

The present edition shows evidence of careful revision along certain lines, and lack of it along others. The index has been very carefully revised, and a number of titles introduced which were formerly in the text but not mentioned in the index. The following new drugs have been described at length, viz.: Eucalyptus Gum, Saw Palmetto, Thyroid Gland, and brief mention made of the fruits of *Setaria glauca*, *Echinochloa crus galli*, and of Indian and Japanese fennel.

The constituents of the drugs mostly correspond with recent investigations, notably in the case of *podophyllum*. The constituents of *pulsatilla* should have been stated, so as to make them clearer to students; following *anemone* camphor should have been the words, *the latter* is oily, crystallizing, etc., etc., as it now stands it is not clear to which of the four constituents this description applies. It is to be regretted that a few of the titles differ from those of the Pharmacopœia as incorrect impressions are created thereby in the minds of students which are hard to eradicate. *Coca* leaves are official as *Coca*, not as *Erythroxyton*; *Hyoscyamus* leaves are official as *Hyoscyamus*, not as *Hyoscyamus folia*; *arnica* flowers as *Arnica flores*, not as *arnica*; *Conium* fruits as *Conium*, not as *conium fructus*. The following corrections should be made in botanical origins; *amygdala* is derived from *Prunus amygdala*, De Candolle, not *A. communis*; *Rhus toxicodendron* from *R. radicans*, Linné, not *Rhus toxicodendron*. *Strophanthus*, according to the Pharmacopœia, is derived from *Strophanthus hispidus*, De Candolle, the *Materia Medica* classes them under the head of *False Kombe Seeds*. *Cinchona rubra* should be mentioned under the head of *Official Cinchona Barks*, as being official in the U.S.P.

The following corrections should be made in the text:

Under the head of "Tests for Pancreatin," sodium chloride should be *sodium bicarbonate*.

Under the head of *Oleum Bubulum*, 0° C. is stated to be equal to 82° F.; it should be 32° F.

Under the head of *Oleum Lini*, the congealing-point is stated as — 27° C. (— 16.5° F.); agreeing in this respect with former editions of the National Dispensatory, the last edition of the latter, however, agrees with the U.S.P. in making it — 20° C. (— 4° F.).

The dose of *Grindelia* is stated to be 2-4 grams (gr. xv — 3i); it should be (gr. xxx — 3i).

Chenopodium is stated to be nearly 2 millimetres ($\frac{1}{12}$ inch) in diameter, as is also stated in the U.S.P. of 1880 and 1890, and in Culbreth's *Materia Medica*. If this fruit be compared in size with the seeds of *Sinapis nigra* (which is correctly stated in both the Pharmacopœia and Maisch's *Materia Medica* to be about 1 millimetre ($\frac{1}{8}$ inch) in diameter), it will be found to be smaller; the size should be stated as about 0.8 millimetres ($\frac{1}{32}$ inch) in diameter.

Podophyllum is stated to be inodorous, anyone acquainted with the rhizome

knows that it has a strong characteristic odor. The odor of Belladonna should be stated as slightly narcotic.

The bast fibres of Mezereum are said to be "in irregular transverse layers," which is an impossible arrangement, *tangential* layers would make the description correspond with that of the National Dispensatory.

It is to be regretted that the photo-micrographs introduced into the sixth edition have also been retained in the seventh; for while they are brought out more clearly than before, they are of little value in teaching the structure of the barks.

That of *Ulmus*, on p. 189, gives but little idea of the arrangement of the bast fibres, medullary rays or mucilage-sacs.

A comparison of the engraving of a transverse section of *Granatum*, p. 175, magnified 40 diameters, which shows the structure beautifully clear and distinct, illustrating the text admirably, with that of the photo-micrograph of *Rubus*, p. 174, magnified 45 diameters, makes the latter suffer badly.

These faults, however, detract but slightly from the value of the work, and it will no doubt continue as before, to be an authority on the subject.

C. B. LOWE.

MARYLAND STATE PHARMACEUTICAL ASSOCIATION. Sixteenth Annual Proceedings. Blue Mountain, June 21-24, 1898.

The Proceedings of the Association is enriched by a number of papers on practical subjects, as: "Notes on Formulas submitted by Committee on Pharmacy," by H. P. Thynson and H. A. B. Dunning; "Saturated Solution of Potassium Iodide," by H. P. Thynson; "Purity of Oil of Peppermint," by Louis Schulze; "The Chemistry of *Digitalis* and *Aloes*," by A. R. L. Dohme. There has been an increase in membership, the finances are in good condition, and there is every evidence that the meetings are valued by the members.

WISCONSIN PHARMACEUTICAL ASSOCIATION. Eighteenth Annual Meeting. Held at Waupaca, August 30-September 2, 1898.

The Proceedings of this Association have always contained a number of excellent papers. This year is no exception. The following are the titles of some of the papers: "To What Extent is Distilled Water Used in Pharmacy?" by Otto J. S. Roberg. The author calls attention to the reports of the Committee on Adulteration of the New York State Pharmaceutical Association, who found as much as 50 parts solid to 100,000 parts, and that of the Wisconsin Drug and Food Commissioner on examination of twenty-two samples of natural water who obtained 43 parts solid in 100,000 parts. The author examined some distilled water on one occasion which he purchased, and found it to contain more solids and chlorine than the water obtained from the faucet. He recommends E. R. Squibb's bottle for preserving distilled water.

H. G. Eberle has examined "Linseed Meal" of the market and found four samples to meet the U.S.P. requirements; two were slightly below the standard, and one was nothing more than ground oil-cake. The adulteration of samples of insect flowers, elm bark and some of the spices was investigated by E. J. Thites. The dalmatian insect powder contained ox-eye daisy flowers, stems and starchy material. Elm bark was adulterated with flour and mineral matter. Black pepper contained pepper shells.

The metric system received attention from P. Sauerhering, and "That a woman makes as good a pharmacist as a man, providing she has equal advantages" was discussed by Martha M. James. The remaining papers were of a general practical trade character. We find on page 23, in the Treasurer's Report, a balance on hand besides investment in Government bonds.

MICHIGAN STATE PHARMACEUTICAL ASSOCIATION. The sixteenth annual meeting. Held at Port Huron, August 2-4, 1898.

In the three days' session of this Association there is evidence in the Proceedings of considerable work and intellectual entertainment. Several general papers were presented, one, being by Professor Schlotterbeck, on "Tea Culture," which was illustrated with numerous lantern slides. Another was by Prof. A. B. Lyons, on "Some Things a Botanist would see in Honolulu." There were also given some interesting practical papers and reports. The report of the Adulteration Committee showed a diminution in strength of chlorinated lime in time; nine samples of spirit of nitrous ether yielded anywhere from 0.36 to 11.42 per cent. NO; eight samples of jalap assayed between 6.75 and 10.33 per cent. of resin; eight samples of reduced iron contained between 7.0 and 64.25 per cent. of metallic iron; six samples of dilute hydrocyanic acid gave 0.4 to 1.02 per cent. of HCN. C. C. Sherrard gave "Some Notes on Adulteration of Drugs and Composition of Various Compounds." The author examined samples of potassium iodide, manganese dioxide, tartaric acid, sodium bicarbonate, magnesia, hydrochloric acid, copaiba, beeswax, port wine, cotton-root bark, fish glue, creosote, oleoresin, cubeb, potassium carbonate, uterine powder for painful menstruation, rough on rats, malt extracts, oil of sandal wood, apiol and colocynth apples.

Professor Lyons gave a paper on "The Chemical Examination of Wines," an excerpt of which is to be found in the *Proc. A. Ph. A.*, 1898, p. 412. A number of papers of general trade interest were also read. The treasury of this Association does not show the prosperity of the neighboring associations of Wisconsin and Minnesota, in spite of the fact that the Proceedings contains advertisements.

MINNESOTA STATE PHARMACEUTICAL ASSOCIATION. Fourteenth annual meeting. St. Paul, June 15-16, 1898.

The Proceedings contains a number of papers by Professor Wulling:

- (1) On chemical microscopy.
- (2) The preservation of nutmegs, in which the author has employed mercury, as well as chloroform and other agents generally used.
- (3) Inferior mercurial ointment. Of fifteen samples purchased in retail stores only one answered pharmacopoeial requirements.
- (4) Powdered drugs.

Some other valuable papers of general trade interest were read. There is a balance in the hands of the Treasurer, and a few new members were elected.

VERMONT STATE PHARMACEUTICAL ASSOCIATION. Fifth annual meeting. Held at Montpelier, October 25-26, 1898.

One of the interesting features of the Vermont meeting was an address by Prof. A. B. Husted, of Albany, N. Y., on "Pharmacy—Past, Present and

Future." The report of W. F. Root, who was a delegate to the American Pharmaceutical Association, is a well-written and interesting one, and ought to bring more Vermonters into the Association. There is cash in the hands of the treasurer.

KENTUCKY PHARMACEUTICAL ASSOCIATION PROCEEDINGS. Twenty-first annual meeting held at Tatham Springs, Kentucky, June 21-23, 1898.

The Proceedings contains a number of papers of general trade interest, besides one by Professor Dilly on "Peppermint Culture." The object of this paper was to awaken an interest in the cultivation of medicinal plants by the members and others.

There were a large number of new members elected, and the treasurer's report showed a balance of \$72.76.

VIRGINIA PHARMACEUTICAL ASSOCIATION. Seventeenth annual meeting held at Natural Bridge, Virginia, July 19-21, 1898.

Among the papers and reports read at the last meeting of this Association may be mentioned the following: "Chemical Constitution of Nitrogenous Organic Compounds," by Dr. Wm. R. Jones. George E. Barksdale, Chairman of the Committee on Adulterations, reported on the examination of tr. opium, tr. nux vomica, tr. iron chloride, cream tartar, tr. arnica, tr. belladonna, spt. nitrous ether and quinine sulphate. Several new members were elected and there is a balance of \$97.34 in the treasury.

MISSOURI PHARMACEUTICAL ASSOCIATION PROCEEDINGS. Twentieth annual meeting held at St. Louis, June 7-11, 1898.

One of the important papers in the Proceedings is the paper by G. H. Chas. Klie, on "The United States Pharmacopœia." An abstract of this paper has already appeared in the January issue of this JOURNAL. Among other papers may be mentioned: "An Eucalyptymol," by H. F. Hassebrock; a formula by Francis Hemm, on "Aromatic Fluid Extract of Cascara Sagrada," which differs from that of the National Formulary in that freshly slaked lime is substituted for calcined magnesia; "A Specially Refined Borax," contained, according to an examination by Carl G. E. Klie, but 5 per cent. of borax, sodium carbonate and starch. G. H. C. Klie contributes a note on "Extractum Colocynthis." H. M. Whelpley has continued his report on the "Metric System in Prescriptions." Ambrose Mueller gave a "Report of Committee on National Formulary." The following preparations had been studied and formulas proposed: Liquor Antisepticus, Elixir Phosphori Compositum, Elixir Pepsini, Elixir Digestivum Comp., Tinctura Rhamni Purshianæ Dulcis, Elixir Rhamni Purshianæ Dulcis, Tasteless Syrup of Quinidine, Liquor Ferri Peptonati Cum Mangano. H. F. Hassebrock has suggested an improved formula for Mistura Chlorali et Potassii Bromidi Composita, N. F.

From the enumeration of the papers presented, as well as the Proceedings of the Association, we observe that it is a practical organization. Consequently it is a successful organization with large membership; the treasury contains a comfortable balance, and the Proceedings are published without the aid from any advertisements.

CONVERSAZIONE OF THE AMERICAN PHILOSOPHICAL SOCIETY.

The annual *Conversazione* of the American Philosophical Society at Philadelphia, was held at the hall of the Society on Independence Square, Friday afternoon and evening, May 12th.

This Society is the oldest of its kind in America, having been founded by Franklin in 1743, "for the promotion of useful knowledge." The custom of holding an annual *conversazione* was inaugurated some two or three years ago and has proved a very attractive, as well as instructive, feature of the work of the Society.

On the present occasion, which was marked by charming social simplicity, and which one might be inclined to attribute to the far-reaching influence of the great Franklin himself, addresses were made at intervals on subjects pertaining to recent advances in various departments of science. In addition, exhibits of scientific interest were arranged around the rooms for the inspection of the members and their guests.

Prof. Arthur W. Goodspeed described "Roentgen Ray Work," using for illustration an improved Rumhkorff coil and a self-regulating X-ray tube, both of which were exhibited by Messrs. Queen & Co.

Dr. Coleman Sellers described the manufacture of "Artificial Graphite" in the electric furnace, in connection with the manufacture of carborundum. Carborundum, which is silicon carbide and next to the diamond in hardness, is manufactured commercially from a mixture consisting of sand 52.7 per cent., coke 34.8 per cent., sawdust 10.7 per cent. and salt 1.8 per cent., the following representing the reaction involved: $\text{SiO}_2 + 3\text{C} = \text{SiC} + 2\text{CO}$.

Recently it has been found that when a carbide is heated to the point of decomposition graphite is formed, and thus but one step is involved in converting carborundum into absolutely pure graphite. Dr. Sellers, commenting on the discovery, in view of the cheapness with which electricity is furnished by the Niagara Falls Electric Power Company, regarded it as one of the most brilliant of modern times. A number of specimens furnished by Mr. A. G. Acheson, of Pittsburg, was shown in connection with this subject.

An account of the "New Gases of the Atmosphere" was given by Dr. G. F. Barker, those present being invited to examine the spectra of argon and helium. This was a concise résumé of the history of the five gases: helium, argon, metargon, crypton and neon, all of which have been discovered within the last five years, and were described in the November, 1898, number of this JOURNAL. Dr. Barker stated that, like mercury, zinc, cadmium, etc., these new elements are all monatomic, and the most interesting problem which is presented in the study of their properties is the question as to whether they are capable of ionization.

Prof. C. L. Doolittle, of the Flower Astronomical Observatory, gave a brief talk upon the "Results of Recent Astronomical Work," diagrams showing the variation of the latitude of the earth being exhibited in connection therewith.

Dr. S. P. Sadtler gave a brief account of "Artificial Indigo," in which he referred to the decline in the commerce of madder roots after the introduction of artificial alizarin, and predicted a similar fate for natural indigo. Continuing, he said that, in 1881 a patent had been taken out for artificial indigo and that in

1897 the manufacturers, the Badische Anilin and Soda Fabrik, had been awarded a medal offered many years ago by the Industrial Society of Mulhouse, Alsace, for the introduction into commerce of indigo obtained by synthesis at a price permitting its competition in all the applications, with indigo made from plants. In 1896-97 the export of natural indigo from India was 10,900,000 pounds, and in the year 1897-98, following the introduction of the artificial product, declined to 7,100,000 pounds. An important difference in the two products depends upon the fact that the natural product comes into commerce in the form of lumps or cakes, which require to be powdered, a matter attended with considerable expense, while the artificial product comes in a finely divided state, usually in paste form, ready for immediate use.

In addition to his remarks on indigo, Dr. Sadtler called attention to samples of electrolytic sodium and sodium peroxide therefrom, which were exhibited by the Rössler & Hasslacher Chemical Company. He said that electrolytic sodium was prepared by Sir Humphrey Davy in 1807, but that its production had been very expensive and its utilization had been very slight until recent years, it being now manufactured on a large scale. It is chiefly used in the amalgamation process for extracting gold and in the manufacture of sodium peroxide, which was a chemical rarity a few years ago. Sodium peroxide is a powerful bleaching agent, and has a special application in the textile industry for bleaching silk, feathers, etc.

Dr. G. F. Barker gave an account of "Wireless Telegraphy," using apparatus for demonstrating its feasibility, which was furnished by W. G. Clarke. In some preliminary statements on the subject, Dr. Barker made the remark that we had always had wireless telegraphy, this being exemplified by the eye and its reception of waves of light. This remark was based on the hypothesis proposed by Dr. Maxwell in 1865, and confirmed in 1888, that light and electricity are identical.

A collection from the Philadelphia Commercial Museums of rare, curious and valuable products, representing both the animal and vegetable kingdoms, was described by Dr. William P. Wilson, Director of the Museums.

Among them were samples of artificial silk, which Dr. Wilson said is manufactured from paper waste or from cellulose. The cellulose is dissolved in nitric or sulphuric acid, and then the mixture is treated with alcohol or ether, after which the product thus obtained is transformed by mechanical processes into a fibre which has about 65 per cent. the strength of silk.

There were a number of other very interesting exhibits, but space does not permit their mention here.

F. Y.

CONVENTION FOR THE REVISION OF THE UNITED STATES PHARMACOPŒIA.

To All Whom it may Concern :

In accordance with instructions given by resolutions passed at the National Convention for Revision of the Pharmacopœia of the United States of America, held in Washington, A.D. 1890, I herewith give notice that a General Convention for the Revision of the Pharmacopœia of the United States of America will be held in the city of Washington, D. C., beginning on the first Wednes-

day in May, 1900. It is requested that the several bodies represented in the Convention of 1880 and 1890, and also such other incorporated State Medical and Pharmaceutical Associations and incorporated Colleges of Medicine and Pharmacy as shall have been in continuous operation for at least five years immediately preceding this notice, shall each elect delegates, not exceeding three in number; and that the Surgeon-General of the Army, the Surgeon-General of the Navy and the Surgeon-General of the Marine Hospital Service shall appoint, each, not exceeding three medical officers, to attend the aforesaid Convention.

It is desired that the several Medical and Pharmaceutical bodies, and the Medical Departments of the Army, Navy and Marine Hospital Service shall transmit to me the names and residences of their respective delegates so soon as said delegates shall have been appointed, so that a list of the delegates to the Convention may be published, in accordance with the Resolutions passed at the 1890 Convention for the Revision of the Pharmacopœia, in the newspapers and medical journals in the month of March, 1900.

Finally, it is further requested that the several Medical and Pharmaceutical bodies concerned, as well as the Medical Departments of the Army, Navy and Marine Hospital Service, shall submit the present Pharmacopœia to a careful revision, and that their delegates shall transmit the result of their labors to Dr. Frederick A. Castle, 51 West Fifty-eighth Street, New York City, Secretary of the Committee of Revision and Publication of the U. S. Pharmacopœia, at least three months before May 2, 1900, the date fixed for the meeting of the Convention.

H. C. WOOD,
*President of the National Convention
for Revising the U. S. Pharma-
copœia, held in Washington,
D. C., A.D. 1890.*

UNIVERSITY OF PENNSYLVANIA,
PHILADELPHIA, PA., May 1, 1899.

AMERICAN PHARMACEUTICAL ASSOCIATION.

The following circular-letter has been issued by Prof. A. B. Lyons, Chairman of the Section on Education and Legislation of the American Pharmaceutical Association:

"The meeting at Put-in-Bay promises to be one of unusual importance as regards the work of the Section on Education and Legislation. The way has been cleared by the efficient work done in the past, for the intelligent framing of a model pharmacy law. It is hoped that every member of the Association will study carefully the reports of past meetings bearing on this important question, that they will familiarize themselves especially with the details of fact contained in the report presented at the Baltimore meeting, and come to Put-in-Bay with very definite ideas about each important feature of a model pharmacy law.

"While the Association may find that it is not yet ready to take final action, it should be possible, by concentrating thought and effort in this direction, to

make a good beginning in the constructive work for which such abundance of material has been accumulated.

"Another important subject which should receive especial attention at the coming meeting is that of the toleration by the medical and pharmaceutical professions of nostrums offered either without formulas or with false formulas. Sustained by the potent influence of the large advertising patronage involved, the evil has grown until it threatens the very existence of scientific pharmacology. Can nothing be done to check it? Action must be prompt to be effective. Any suggestion of a practical remedy will be timely. Send in your contribution to this symposium.

"All papers, whether on the above or other subjects pertinent to the work of the Section, should be in the hands of the Committee by August 15th, in order that they may be printed before the coming meeting. Let each paper be accompanied with a brief abstract of its contents, if possible."

Address all papers and communications to the Chairman of the Committee, A. B. Lyons, 72 Brainard Street, Detroit, Mich.

PENNSYLVANIA PHARMACEUTICAL ASSOCIATION

All of the officers and various committees connected with the Pennsylvania Pharmaceutical Association are working hard to make the next annual meeting, at Philadelphia, on June 12th, 13th, 14th, 15th, 16th, etc., a success unequalled in the history of the organization.

The programme, as at present mapped out, includes business sessions on Tuesday and Wednesday, June 13th and 14th, with a reception and collation at the Philadelphia College of Pharmacy on Monday evening. A reception at the Union League Club on Tuesday, and a trip to Willow Grove by trolley, with a concert by the famous Banda Rossa and a collation in the Casino after the music, on Wednesday evening. On both of these days special programmes will be arranged for the visiting ladies to occupy the hours devoted to the business sessions.

On Thursday morning, June 15th, a special train will be taken for Atlantic City (tickets good to remain over until Monday will be supplied in entertainment coupon books), where active measures have been taken to make both Thursday and Friday contribute their full quota of enjoyment to those present. There will be an entertainment in the Casino on the New Steel Pier, sailing parties, with trolley rides to Longport, etc.

All of the visiting members and pharmacists with their ladies from outside Philadelphia, will be regarded as the guests of the wholesale and retail trade of that city, and will receive entertainment coupons free of cost. Philadelphia pharmacists not members of the organization will receive a coupon book for themselves and one lady on the payment of five (\$5.00) dollars, which will cover all Philadelphia entertainments.

The Local Secretary, W. L. Cliffe, Kensington Avenue and Somerset Street, Philadelphia, specially advises each visiting pharmacist to write to him stating the probable time of arrival, the number and kind of rooms wanted, and the name of each member of the party.

The hotel selected in Philadelphia is the "Continental," where a rate has been obtained, American plan, of two and one-half (\$2.50) dollars per day and upwards, according to kind and location of rooms.

The Hotel "St. Charles" at Atlantic City has been secured at a rate of two and one-half (\$2.50) dollars per day. This is one of the best hotels on the island and its regular rates are four (\$4.00) dollars per day.

DELAWARE PHARMACEUTICAL ASSOCIATION.

The Thirteenth Annual Meeting of the Delaware Pharmaceutical Association, was held at the Clayton House, Wilmington, May 4th. The opening session was held at 10.30 A.M., President Harvey in the chair. After the President's address, and reports of officers, the Association was addressed by Horace G. Knowles, ex-U. S. Consul to Bordeaux, France, on the "Advantages of Association."

The reports of standing committees were then heard, after which a short paper was read by Dr. Robin, of Newark, Del., the newly appointed State Bacteriologist, followed by an explanation of the proposed working of the laboratory, and the assistance expected from the pharmacists. After additional reports Prof. S. P. Sadtler, of the P.C.P., gave an important and timely address on "Side Issues." After dinner the Association took a trolley ride through Wilmington and its beautiful suburbs. After considerable argument it was decided unanimously to join as an association the National Retail Druggists' Association and pay the twenty-five cents per member. The final session was held at 5 P.M., at which nominations were made of four names, to be sent to the Governor, from which one will be selected for appointment to the Pharmacy Board on July 1st. The officers elected for the ensuing year are as follows :

President.—R. W. Cannon, Bridgeville.

Vice-President.—Owen C. Spear, Wilmington (for New Castle Co.).

Vice-President.—Thomas F. Hammersly, Milford (for Kent Co.).

Vice-President.—Dr. D. L. Mustard, Lewes (for Sussex Co.).

Treasurer.—Jos. P. Williams, Wilmington.

Secretary.—F. W. Fenn.

Executive Committee.—Wm. Poole, Chairman, Wilmington ; J. S. Beetem, Wilmington ; C. D. Sypherd, Dover.

The hospitalities of the Association were heartily extended to the visitors present.

C.B.L.

PHILADELPHIA RETAIL DRUGGISTS' ASSOCIATION.

The retail druggists of Philadelphia have at last realized that the Philadelphia Association of Retail Druggists have done, and are doing, good work for them, for at the regular meeting held on Friday, May 5th, twenty-eight applications were brought in by the members of the Executive Committee.

Mr. J. C. Perry, Chairman, reported that the Executive Committee thought best to appoint a member of the Association to take charge of each ward and

solicit new members. President McIntyre called the wards off, and the following members volunteered to take charge of the work :

1st, 2d, 3d, 4th and 5th, Mr. Jacob Eppstein ; 8th and 30th, Mr. H. B. Morse ; 9th, Mr. Clarence H. Campbell ; 10th, Mr. Chas. Leedom ; 12th, Mr. John D. Burg ; 13th, Mr. Geo. W. Fehr ; 14th, Mr. E. R. Gatchel ; 15th, Mr. S. E. R. Hassinger ; 18th, Mr. A. Hoch ; 19th, Mr. Robt. McNeil ; 21st, Mr. Wm. Morrison ; 22d, Mr. W. H. Poley ; 23d, Mr. Howard J. Seigfried ; 24th, Mr. James C. Perry ; 25th and 35th, Mr. W. H. Vandegrift ; 26th, Mr. John J. Keenan ; 27th, Mr. P. N. Pinchback ; 28th and 32d, Mr. W. G. Nebig ; 31st, Mr. D. H. Ross ; 33d and 38th, Mr. W. L. Cliffe ; 34th, Mr. Theo. Campbell ; 36th, Mr. E. J. Finnerty, Jr. ; 39th, Mr. W. H. Deibert.

President McIntyre spoke of the work that was being accomplished by the Western Pennsylvania Association of Retail Druggists, and Mr. J. C. Perry offered the following resolution, which was adopted, and a copy of the same ordered to be forwarded to the Secretary of the Western Association :

"WHEREAS, The Philadelphia Association of Retail Druggists learn with regret that certain patent medicine firms ignore the appeal of the Western Pennsylvania Retail Druggists' Association to comply with their request for the placing of their goods through the jobbers, as mentioned by the said Association ; and

"WHEREAS, We believe such manufacturers intend extending a similar policy to other sections of the United States, which would be detrimental to the retail drug business ; and be it

"Resolved, That it is the sense of the Philadelphia Association of Retail Druggists that each member use his best endeavor to decrease the sale and use of such manufacturers' productions.

"And we also approve in every way the action of your Association in this the initial contest, and assure you of our moral support ; and if our Association can be of any service to you in this part of the State we will be pleased to consider any proposition.

"Cordial greetings to all your officers and members, and urge them to stand firm, and you will be sure of victory."

Mr. J. C. Perry thought the Association strong enough now to accomplish good results, and suggested that the wholesale druggists, who conduct a retail trade, should do it in a manner not to conflict with the retail druggists.

Mr. W. H. Poley offered the following resolution, which was adopted, and the Secretary requested to send a copy to each accredited wholesale druggist in Philadelphia :

"It is respectfully suggested by the Philadelphia Association of Retail Druggists that the wholesale druggist, doing a retail business, so conduct the latter as to conflict as little as possible with the retailer, and in all cases charge an advance on price that is charged to the retail druggist."

Mr. W. L. Cliffe reported that Senate Bill No. 153, prohibiting the sale of opium preparations, etc., excepting on physicians' prescriptions, had been defeated through the efforts of the Association.

The following committee was appointed to represent the P. A. R. D. at the meeting of the Pennsylvania State Pharmaceutical Association to be held in

Philadelphia, June 13th : Messrs. W. H. Poley, Jacob Eppstein, Chas. W. Ry-nard, H. B. Morse and W. A. Rumsey.

It is the wish of the Association that all druggists in Philadelphia should become members, and at the same time become affiliated with the National Association. We want your support and your influence ; do not wait for a representative of the Association to call on you ; this takes time and costs money. Kindly send in your application, together with your membership dues, \$1, to the Secretary, W. A. Rumsey, 920 North Forty-first Street.

The next meeting will be held in the Museum of the Philadelphia College of Pharmacy, Friday, June 2d, at 3 P.M. At this meeting delegates and alternates will be elected to attend the National Convention, to be held at Cincinnati, Ohio, October 3d, 4th, 5th and 6th.

W. A. RUMSEY, *Secretary*.

MINUTES OF THE PHARMACEUTICAL MEETING.

PHILADELPHIA, May 16, 1899.

The last of the pharmaceutical meetings for the session of 1898-99 was held in the Museum of the College with William J. Jenks, First Vice-President of the College, in the chair.

The meeting was well attended, and was in every way a fitting close to what has been a profitable series of meetings.

The Secretary called attention to the fact that in this JOURNAL for May, page 256, on the twentieth line from the top of the page, an omission occurs in the formula for *Tinctura Opii Deodorata cum Camphora*, and that after the word odor the following should be inserted, "exhaust the opium by percolating with water."

Mr. Otto de Kieffer was the first speaker introduced and read a paper on "Distilled Water and its Uses."

The principal object had in view by the author was that of showing the desirability and necessity of using distilled water in all pharmaceutical operations where water is required, whether in the compounding of prescriptions or for making preparations. He remarked that much of the water ordinarily supplied is unfit for prescription work on account of the mineral matter held in solution, and indicated some of the advantages in using pure water for making preparations, which not only enhances the appearance in some cases, but plays an important role in their keeping qualities.

A number of interesting questions were brought up in the discussion of this paper. J. W. England, remarking upon the subject of the paper, said that all would agree that pure water should be used for pharmaceutical purposes, as also for drinking. On the other hand, he said, there appeared to be more than one side to the question, and alluded to the recent investigations of the German chemist Koeppé, reference to which was made in the January number of this JOURNAL, which were to the effect that distilled water acts injuriously on the cells of the stomach.

Mr. de Kieffer thought that absolutely pure distilled water, or simply H_2O , was specified by the German investigator, and said that practically this is not attainable, and that therefore the argument did not apply.

Mr. England then said that the question as to whether or not distilled water was unfit biologically and chemically for drinking purposes, would have to be left to physiologists to decide upon its merits.

Prof. F. X. Moerk, referring to the author's remarks concerning the use of water free from mineral salts for making pharmaceutical preparations, said that an important problem was presented. He said that in treating desiccated drugs with pure water some of the mineral constituents were extracted, and thus it became impossible to limit entirely the presence of mineral salts in many preparations.

Mr. E. M. Boring said that some years ago he adopted the plan of adding alum to the Schuylkill River water and then straining it through absorbent cotton.

Mr. de Kieffer remarked in this instance that the mineral matter was precipitated by the alum, but that the bacteria were unaffected; or else if sufficient alum were added to destroy bacteria the water would be unwholesome.

A communication entitled "Further Contributions Concerning Husa," by Prof. John Uri Lloyd, was announced on the programme, but, owing to the author's recent absence from his home in Cincinnati, the article was not received. Samples of the morphine and glycerin which Professor Lloyd obtained in his analysis were, however, received, and, in calling attention to them, Prof. J. C. Peacock reviewed some of the most important features of Professor Lloyd's paper on "An Investigation into Husa," etc., which was published in the May issue of this JOURNAL. Prof. Henry Kraemer commended the work done by Professor Lloyd, and said that his investigation furnished an ideal exposure of a fraudulent undertaking. He thought it would be well to bear this experience in mind when considering questions pertaining to new drugs or preparations.

A sample of Elixir of Curaçoa, made by Wallace Procter, was exhibited. J. W. England, remarking upon the preparation, in the absence of the author, said that it was made by distillation, and was of excellent quality. The paper will be published in a subsequent issue of this JOURNAL.

Dr. J. L. D. Morison called attention to an exhibition under the microscope of urinary sediments, and made some remarks on the newer methods of staining in the examination of sputum, pus and urinary sediments.

Among those taking part in the discussion of this subject were Messrs. England, de Kieffer, Stedem and Beringer. There was one point on which all of the speakers agreed, and that was that there is a great need for this class of work, and that the field is open to pharmacists. J. W. England said, with reference to his experience in this line of work, that he had found the commercial anilin stains unreliable, and that he found those made by Dr. Grüber to be more satisfactory. He then referred to Ehrlich's Triple Stain for blood and said that in a letter sent by T. B. Fletcher, of Johns Hopkins University, to an official of the Philadelphia Hospital the following information is given: "An important factor in the success of this stain is the chemical composition of the products. We have used the stains of Dr. Grüber, of Leipzig, Germany,¹ which are fairly satisfactory. Every one making Ehrlich's Stain finds that only one out of several mixtures proves satisfactory, the others being inferior, but capable of

¹ Charles Lentz & Sons, of Philadelphia, are his local agents.

being 'doctored' by adding a few drops of the solution of the particular stain which seems to be lacking. This has also been our experience.

"In making the saturated aqueous solutions of the three stains, we use rather warm water for the acid fuchsin and methylene green, but water at ordinary temperature for the orange G.

"The stains are thoroughly rubbed up in a mortar with the water, then poured into test-tubes and allowed to stand, so that the excess of compound used may precipitate.

"The formula we now use is the one last recommended by Ehrlich.

"It is as follows :

	Cubic Centimeters.
Sat'd Aq. Sol. Orange G.	13 to 14
" " " Ac. Fuchsin	6 to 7
Distilled water	15
Alcohol	15
Sat'd Aq. Sol. Methylene Green	12.5
Alcohol	10
Glycerin	10

"These are mixed together in a beaker, and when the methylene green is added, it must be added very slowly, and thoroughly stirred.

"The mixture improves after standing for a number of days.

"Specimens properly heated give a nice orange or buff color with this mixture, and the leucocytes and their granules are well differentiated."

An interesting paper on the question : "What is Pharmacognosy?" was read by Prof. Henry Kraemer. After having made some general observations in regard to the relations of the various divisions of scientific investigation, the author said that the various sub-departments of science cannot be determined with exactness once and for all, but that they must be evolved as experience and study add to our knowledge of the different branches.

He then showed how the science of Pharmacognosy (the term being derived from two Greek words, meaning drug knowledge), has been evolved, quoting the most eminent authorities on the subject as to its meaning and application. The subjective and objective relations of pharmacognosy were then considered and the point emphasized that while the methods to be pursued in this study are strictly scientific, the object to be attained may be of practical importance. He said that this is the part of the subject which seems not to be well understood by teachers and investigators. He therefore divided the subject into a pure scientific pharmacognosy and a practical pharmacognosy. The latter he defined as the art of making money out of drug knowledge, and to illustrate this he considered some of the problems with which practical pharmacognosy has to do. (1) It is concerned in developing that kind of work which will enable the pharmacist to devote his time and ability to the consideration of drugs rather than to matters not in the line of his art; (2) it is concerned in the selection of drugs; (3) experiments relating to the cultivation and collection of medicinal plants come within its province; and (4) it is concerned with the origin and habitat of drugs.

The last paper presented was on "Some New Preparations of Calendula," and was read by Geo. M. Beringer (see page 268).

The papers having been considered, attention was directed to the following exhibits: (1) A device for holding a funnel in stable position either while pouring a liquid into a bottle, or for the purpose of filtration. It consists of a cylindrical piece of tin with conical expansions of the same dimension at either end, the one designed to hold the funnel and the other to fit over the shoulder of the bottle; (2) a device for dividing powders, the essential features of which were described by the inventor, Wm. G. Toplis, as follows: It consists of two distinct parts; the first is simply an oblong rectangular block of hard wood, having in one side a V-shaped groove running through its length. This groove receives the powder; to prevent the same from falling out of the ends of the groove brass plates are screwed to the ends of the block, one plate being movable so that the powder may be slid out of the groove after division. The division is accomplished by the second part of the apparatus. It consists of a narrower block than the first one, but exactly twice its length; to this stick there is attached a number of V-shaped metal teeth, equidistant from each other; these teeth fit accurately the V-shaped groove in the first block. Now it will be readily seen that when the powder is evenly adjusted in the groove, and then the teeth inserted, the powder will be encased in so many separate compartments. Now if the plate be removed, the powders may be pushed out one after another onto papers, as desired; and (3) the "Acme Medicine Glass Cover and Dose Indicator," and the "Acme Powder Measure."

The chairman reappointed the same Committee on Pharmaceutical Meetings for the ensuing year.

On motion, the meeting adjourned.

THOMAS S. WIEGAND,
Registrar.

OBITUARY.

PROF. DR. LUDWIG BUCHNER, the famous author and philosopher, died in Darmstadt, his native city, April 30th, in the 75th year of his age.

After the completion of his studies at the University, he practiced medicine in Darmstadt, and later (in 1854) became Privatdocent and assistant in the Clinic in Tübingen. It was while here that his principal work, "Kraft und Stoff" ("Force and Matter") appeared. In it he first advocated the doctrine that force and matter are indestructible, and while this opinion is universally accepted to-day, the views set forth in this work caused him to lose his position. He then resumed the practice of medicine in Darmstadt and later devoted himself almost entirely to his literary pursuits. Buchner may be said to have been one of the earliest advocates of the Darwinian theory, and by some is ranked with Haeckel and Vogt as representatives of this theory in Germany. He applied these principles to social problems and of his works on this subject we may mention "Die Darwin'sche Theorie von der Entstehung und Umwandlung der Lebewelt," "Die Macht der Vererbung," "Darwinismus und Socialismus," etc.

PROFESSOR FRIEDEL.—We learn through the *Chemist and Druggist* that Professor Friedel, the eminent chemist, died at Montauban, near Paris, on April 19th, of a pulmonary affection. He was 67 years of age, having been born at Strasbourg in 1832. During the earlier part of his professional

career Professor Friedel held successively the positions of conservator of the collections of mineralogy at the Paris School of Mines, lecturer at the Ecole Normale, and professor of mineralogy at the Faculty of Sciences. Since 1884 he had been lecturer on organic chemistry at the Sorbonne, in Paris, and during the past two years Director of the classes for the practical teaching of chemistry as applied to industry, which was inaugurated by him. He was a member of the Paris Academy of Sciences, and it was at the meetings of this institution that he made public his researches on acetone, the aldehydes, lactic anhydrides, etc. He is said to have been incomparable as a teacher.

ARTHUR STEPHEN HILL.—By the death of Mr. Hill, on March 30th, at the advanced age of 97, the Pharmaceutical Society has lost a member who was among the number of its earliest supporters when a member of the old firm of Arthur Hill & Son. Mr. Hill occupied a prominent position in the wholesale drug trade, and was a member of the original Drug Club sixty years ago. It will be remembered that very largely through the influence of Mr. Hill and his son, Mr. Arthur Bowdler Hill, of the firm of Davy, Hill & Son, Yates & Hicks, the Salters' Company founded a number of scholarships in connection with medical science and pharmacy. One of these was attached to the school of the Pharmaceutical Society, and is a permanent illustration of the interest taken by the late Mr. Hill in the promotion of the Society's objects.—*Pharmaceutical Journal*.

MANGALORE PEPPER.—The black pepper of Mangalore, one of the provinces of Hindoostan, is distinguished according to T. F. Hanausek (*Zeitsch. Unter. such. Nahr. u. Genuss.*, 1898, 1, 153) from the ordinary commercial black pepper by its size and beauty. The Mangalore pepper fruit is either round or somewhat egg-shaped, and of a very deep black color. They have a diameter of about 7 mm., and 100 fruits weigh 8.6 grammes, whereas, the common black pepper weighs 6.2 grammes. The ash amounts to 3.4 per cent. Externally the Mangalore pepper is uneven and wrinkled. The inner anatomy of the Mangalore and black pepper resemble each other very closely. The former, however, is characterized by the parenchyma of the pericarp, consisting of large, strongly lignified and uniformly thickened walls upon all sides. In size they are 87.5–120 mikrons x 45–50 mikrons. The stone cells occur either singly or more generally in groups from 2 to 6 cells. Underneath the schleridien layer occurs in the Mangalore pepper, as pointed out first by Tschirch in the common black pepper, a layer of strongly thickened cells, which swell very much upon heating with KOH solution. The cells containing the pigment are very perceptibly radially elongated upon treatment with KOH.

SEPARATION OF GERANIOL AND CITRONELLOL.—J. Flatau and H. Labbe describe (*Compt. rend.*, 1898, No. 24) how they have prepared a certain quantity of ether from the two alcohols. The product obtained is washed very carefully with carbonate of soda, and then fractionated in vacuo. After several distillations the ethers are precipitated from the alcohols in excess; by titration 98 per cent. of pure ether is found. Both these ethers possess a very agreeable odor.—*Chem. News*, 1898, 184.

THE AMERICAN JOURNAL OF PHARMACY

JULY, 1899.

ON ACETIC ACID AS A SUBSTITUTE FOR ETHYL ALCOHOL IN EXTRACTING THE ACTIVE PRIN- CIPLES OF SOME OFFICINAL DRUGS.

BY EDWARD R. SQUIBB, M.D., OF BROOKLYN, N. Y.

(SECOND PAPER.)

In continuing this subject for a second paper the writer refers to, without repeating, the introductory matter of the first paper, where the therapeutic and pharmaceutic bearings of such a substitution are discussed and passes at once to the farther work which is relied upon to support or oppose the proposed substitution and define the limits of its application.

In the meantime, it may be well to state that the guarded use of extracts and fluid extracts made with acetic acid has continued and extended in veterinary therapeutics with only favorable reports, so that such a class of preparations may fairly be considered as established for veterinary practice where the large quantities used make the reduced cost a very important consideration. Some hospitals are also still using them in increasing quantities without discoverable objection. The number of physicians known to be using them in private practice, though not yet large, is increasing, and no serious disadvantages have been developed by close and careful observation.

In selecting a drug for competitive investigation in this second paper, cinchona was selected first on account of its importance, next on account of the difficulty there has always been in finding a proper menstruum,—next on account of the difficulty of exhaustion by any menstruum hitherto known, and finally on account of the very considerable amount of time and work that the writer has

given to it for many years past in papers published from time to time in the *Proceedings of The American Pharmaceutical Association*.¹

A fair grade of yellow cinchona was taken which, when carefully assayed by the process to be given in detail farther on, yielded 4.9 per cent. of total alkaloids, of which 2.7 per cent. belonged to the quinine group. This was carefully ground, one portion into a No. 9 powder and another portion to a No. 60 powder. Repercolation was used in exactly the same way as with *nux vomica* in the first paper.

For the U.S.P. No. 60 powder the U.S.P. menstruum of a mixture of eight volumes of alcohol (91 per cent.) and two volumes of glycerin (95 per cent.) was used. For the No. 9 powder a 10 per cent. acetic acid was used. A third single percolation was made of the No. 60 powder with 10 per cent. acetic acid to determine the difference in rate and degree of exhaustion between fine and coarse powder with a 10 per cent. acetic acid menstruum. The U.S.P. menstruum was adopted, first because it is the officinal menstruum, and next because it is pharmaceutically the best menstruum for extracting and holding the active principles in concentrated preparations. But therapeutically these preparations are objectionable because they are overloaded with inert extractive matter, and on dilution either before or after administration deposit copious insoluble precipitates. The percolations were managed exactly as were those with *nux vomica*. Each 100 c.c. fraction as it came off was weighed, and the weight of the same measure of menstruum being subtracted, the difference was noted to indicate the rate and degree of exhaustion and these differences are shown in the following table:

Each portion consisted of 500 grammes of cinchona. The first and fourth portions are single percolations with acetic acid, the only difference being in the fineness of powder, and these are compared in the fourth pair of columns. After the fifth fraction of the first portion the successive fractions were used to moisten and percolate the second portion of 500 grammes, and after the fifth fraction of the second portion the successive fractions of weak percolate were

¹ See *Proceedings* for 1865, p. 214.—1867, p. 391.—1870, p. 161.—1878, p. 715.—*AMER. JOURN. PHARM.*, Vol. XXXIX, pp. 398, 408.—*Ephemeris*, Vol. I, pp. 76, 105, 146, 174.—Vol. III, p. 993.

used to moisten and percolate the third portion of 500 grammes. This third portion, being the limit to which it was decided to carry the repercolations, had all the fractions of percolate grouped together in groups of five, and these larger fractions were reserved for further comparison and for assay, each portion having been carried to practical exhaustion by fresh menstruum to follow the weak percolates.

The irregularities in progression of all the columns of the table are doubtless due to irregularities in the packing of the moistened powders and to changes of temperature.

It must not fail to be noticed that, although the rate of exhaustion is in favor of the acetic acid, it is less favorable than would appear from a casual comparison of the figures. For example, the difference in weight of 100 c.c. of the menstrea is (91.09 from 101.43) 11.06 grammes. The difference between the first pair of figures of the table is $(9.39 - 6.28 =) 3.11$ grammes, or nearly one-half of the acetic acid difference, and therefore, to render these columns strictly comparable, a considerable addition is due to the figures of the acetic acid columns. But the amount of such addition is so difficult to estimate that it must be left indefinite.

The nearly uniform differences of the first fractions of acetic acid percolate from the first and second portions, and from the first three fractions of the third portion, indicate that the acetic acid menstruum is practically saturated with the constituents of the cinchona that are soluble in this menstruum, whilst the increase in the differences of the first five fractions of U.S.P. percolate of the third portion show that this menstruum has a much greater solvent capacity than the 10 per cent. acetic acid. When the difficult solubility even of the acid salts of the cinchona alkaloids is remembered this saturation is not difficult to comprehend. But when these supposed saturations were tried they were found capable of dissolving considerable quantities of the total alkaloids obtained from the assays of other portions of cinchona.

The fourth portion or final pair of columns is given for the purpose of comparing by differences the rate and degree of exhaustion in two percolations with the acetic acid menstruum, managed in exactly the same way, but differing simply in the fineness of the powder, the apparent result being that the exhaustion was more rapid though hardly more complete in the fine powder as far as the differences go.

RATE AND DEGREE OF EXHAUSTION BY DIFFERENCES.

PERCOLATE IN SUCCESSIVE FRACTIONS OF 100 CUBIC CENTIMETRES EACH.	FIRST PORTION.		SECOND PORTION.		THIRD PORTION.		FOURTH PORTION.	
	U.S.P. No. 60 Powder. Differences Grammes.	Acetic Acid No. 9 Powder. Differences Grammes.	U.S.P. No. 60 Powder. Differences Grammes.	Acetic Acid No. 9 Powder. Differences Grammes.	U.S.P. No. 60 Powder. Differences Grammes.	Acetic Acid No. 9 Powder. Differences Grammes.	Acetic Acid No. 9 Powder. Differences Grammes.	Acetic Acid No. 60 Powder. Differences Grammes.
1st fraction .	9'39	6'28	9'41	6'40	11'58	6'43	6'28	5'49
2d " .	8'36	6'11	8'36	6'18	9'82	6'60	6'11	5'18
3d " .	6'83	5'51	7'94	5'84	8 81	6'39	5'51	5'10
4th " .	4'05	4'46	6'57	5'30	7'14	5'49	4'46	4'44
5th " .	2'64	3'33	5'51	4'40	6'03	4'62	3'33	3'60
6th " .	1'90	2'30	3'96	3'36	4'73	3'56	2'30	2'65
7th " .	1'82	1'63	3'34	2'35	4'01	2'61	1'63	2'23
8th " .	1'51	1'26	2'94	1'88	3'80	2'28	1'26	1'57
9th " .	1'40	'88	2'83	1'35	3'46	1'60	'88	1'22
10th " .	1'26	'83	2'39	1'06	3'40	1'35	'83	'97
11th " .	'73	'43	2'00	'88	3'07	1'05	'43	'70
12th " .	'44	'51	1'51	'72	2'78	1'05	'51	'74
13th " .	'64	'40	1'39	'65	2'22	'74	'40	'64
14th " .	'22	'34	1'14	'61	1'95	'89	'34	'42
15th " .	'24	'28	1'16	'56	1'50	'67	'28	'35
16th " .	'99	'69	1'02	'51	1'00	'76	'69	'45
17th " .	'67	'33	1'06	'45	'66	'69	'33	'41
18th " .	'57	'39	'80	'46	1'13	'74	'39	'34
19th " .	'46	'20	'76	'42	'94	'65	'20	'23
20th " .	'25	'28	'69	'46	'68	'54	'28	'21
21st " .	'16	'15	'94	'49	'73	'48	'15	'23
22d " .	'13	'16	'64	'35	'64	'68	'16	'17
23d " .	'13	'05	'63	'35	1'25	'51	'05	'15
24th " .	—	—	'66	'43	'85	'54	—	'06
25th " .	—	—	'43	'25	'78	'24	—	'08
26th " .	—	—	'53	'35	'58	'50	—	'06
27th " .	—	—	'46	'24	'67	'35	—	'08
28th " .	—	—	'45	'33	'40	'50	—	'04
29th " .	—	—	'39	'20	'30	'24	—	'02
30th " .	—	—	'30	'23	'14	'40	—	'09
31st " .	—	—	'23	'13	'22	'17	—	—
32d " .	—	—	'16	'08	'10	'33	—	—
33d " .	—	—	—	—	'17	'17	—	—
34th " .	—	—	—	—	'17	'19	—	—
35th " .	—	—	—	—	'10	'12	—	—
36th " .	—	—	—	—	'08	'12	—	—
37th " .	—	—	—	—	'17	'09	—	—
38th " .	—	—	—	—	'08	'04	—	—

The fractions of the above table were put together in successive groups of five fractions each, the exact measure of 500 c.c. being made up from the next percolate in succession. In this way the 100 c.c. fractions were concentrated into 500 c.c. fractions, which were weighed as well as measured and the differences taken, these larger fractions being carried through in pairs, each being assayed for the total alkaloids contained. For these assays 10 c.c. of the stronger liquids was taken and the results multiplied by 50. For the weaker liquids 20 c.c. was taken and the results multiplied by 25. Each of the three portions consisted of 500 grammes of cinchona and each large fraction consisted of 500 c.c. of percolate.

Of the first and second portions only the first 500 c.c. of percolate was reserved, the succeeding fractions from the first portion being used as menstruum for the second and those from the second portion being carried to the third portion. But all the fractions from the third portion to practical exhaustion were reserved and assayed, and if the repercolation had been carried farther these fractions would have been successively used as menstruum on a fourth portion of cinchona.

The single separate percolation, "Fourth Portion" of the table above, made for the purpose of comparing the results from the use of fine powder against coarse, does not enter the following table, as these were only comparable assays. The first 500 c.c. from coarse powder had 7.5 grammes of alkaloids, while the similar fraction from fine powder gave 8.2 grammes of alkaloid. This leads directly to the conclusion that if fine powder had been used for the principal series of comparisons the results given in the following table would have been more favorable to the acetic acid menstruum by about 9 per cent.

ASSAYS OF CINCHONA PERCOLATES.

500 gm. Portions.	500 c.c. Percolates.	U.S.P. Menstruum, 800 c.c. Alcohol, 91 p. c. 200 c.c. Glycerin, 95 "			Acetic Acid Menstruum, 10 p. c. Acetic Acid.		
		Weight Gm.	Differ- ence Gm.	Total Alkaloids Gm.	Weight Gm.	Differ- ence Gm.	Total Alkaloids Gm.
1st portion	1st 500 c.c.	487.9	32.0	12.1	534.0	26.8	7.5
2d "	1st " "	495.8	39.8	12.7	537.5	30.3	11.9
3d "	1st " "	499.8	44.5	19.5	537.8	30.1	14.9
" "	2d " "	475.1	19.9	9.4	519.3	11.6	9.5
" "	3d " "	468.2	13.0	4.3	511.9	4.2	6.9
" "	4th " "	460.2	5.0	2.7	510.7	3.0	5.9
" "	5th " "	459.8	4.5	2.5	510.2	2.5	3.8
" "	6th " "	457.7	2.4	1.7	509.6	1.9	3.5
" "	7th " "	456.2	1.0	1.6	509.1	1.4	3.0
" "	8th " "	—	—	1.1	—	—	1.1
" "	9th " "	—	—	0.7	—	—	0.8
				68.3			68.8
	1500 gm. Cin-chona of		4.9 p. c.	= 73.5			73.5

In summarizing the results of this work the following conclusions are reached and adopted:

That 10 per cent. acetic acid is a good menstruum for the exhaustion of cinchona.

That the U.S.P. menstruum is a better one for rapid exhaustion, but the percolates are so loaded with useless and objectionable organic matters, from which the acetic acid percolates are comparatively free, that this difference in the character of the results transfers the advantages to the acetic acid side. The stronger percolates from the alcohol and glycerin menstruum are almost syrupy in consistence, are so black as to be almost intransparent, are very astringent, and throw down an unmanageable precipitate of nearly insoluble cincho-tannates on dilution or admixture with other preparations or any ordinary diluents. These disadvantages are of so serious a character as to have always obstructed the use of the official fluid extract and extract.

The acetic acid stronger percolates are nearly free from these disadvantages, and are far more manageable pharmaceutically as well as therapeutically. It is hardly within the range of possibility that

a fluid extract or extract which on dilution splits up into insoluble or difficultly soluble cincho-tannates can be a good therapeutic agent, or that a preparation of the same alkaloidal strength that does not so split on dilution is not better.

The difference in the cost of the two menstrua is very great, the alcoholic menstruum costing about eight times as much as the acid; whilst the acid is much easier to manage in the percolation and in the standardizing process, since evaporation does not injure the percolates nor materially increase the cost by the loss.

The U.S.P. standardizes its preparations of yellow cinchona in an indirect way by requiring that the cinchona from which they are made shall contain not less than 5 per cent. of total alkaloids and at least 2.5 per cent. of quinine, by an assay process which it gives, wherein a chloroform extract is weighed as total alkaloids. Although this is not the only objection to this assay process, it secures a cinchona powder that should contain at least 5 per cent. of total alkaloids, equal to 50 grammes in 1,000, or 25 grammes in 500. The cinchona used for this investigation contained 4.9 per cent. of total alkaloids equal to 49 grammes in 1,000, or 24.5 grammes in 500, or say in 500 c.c. for facility of comparison, although this 500 c.c. weighs 534 grammes.

The U.S.P. requires for its fluid extract that 1,000 c.c. should represent 1,000 grammes of 5 per cent. cinchona, or 500 c.c. containing 25 grammes of alkaloids from 500 grammes of cinchona. No one of the first percolates from either portion by either menstruum comes up to this officinal requirement, but those by the acid menstruum were easily brought to it by evaporation.

The first 500 c.c. of the first portion was evaporated to 150 c.c., and then contained the proportion of 25 grammes of alkaloids in 500 c.c.

The first 500 c.c. of the second portion was evaporated to 238 c.c., and then contained the officinal proportion of 25 grammes of alkaloids in 500 c.c.

The first 500 c.c. of the third portion was evaporated to 298 c.c., and then contained the officinal proportion of 25 grammes of alkaloids in 500 c.c.

In the first of these three the loss in standardizing by evaporation was greatest, and then it amounted to about 350 grammes of 10 per cent. acid, at a cost of less than 4 cents. But this is a maximum loss that in practice could rarely exceed half this amount.

In assaying these largely evaporated extracts before the evaporation and after, very slight loss of alkaloids was discovered, and it is believed that these are fairly safe in acid solution with no greater heat than a water-bath.

This point is in favor of the acid menstruum, since it is the common experience that evaporation with alcoholic menstrea generally reduces the proportion of alkaloids, changing them and probably oxidizing them as is not probable with acid salts and solutions of most alkaloids.

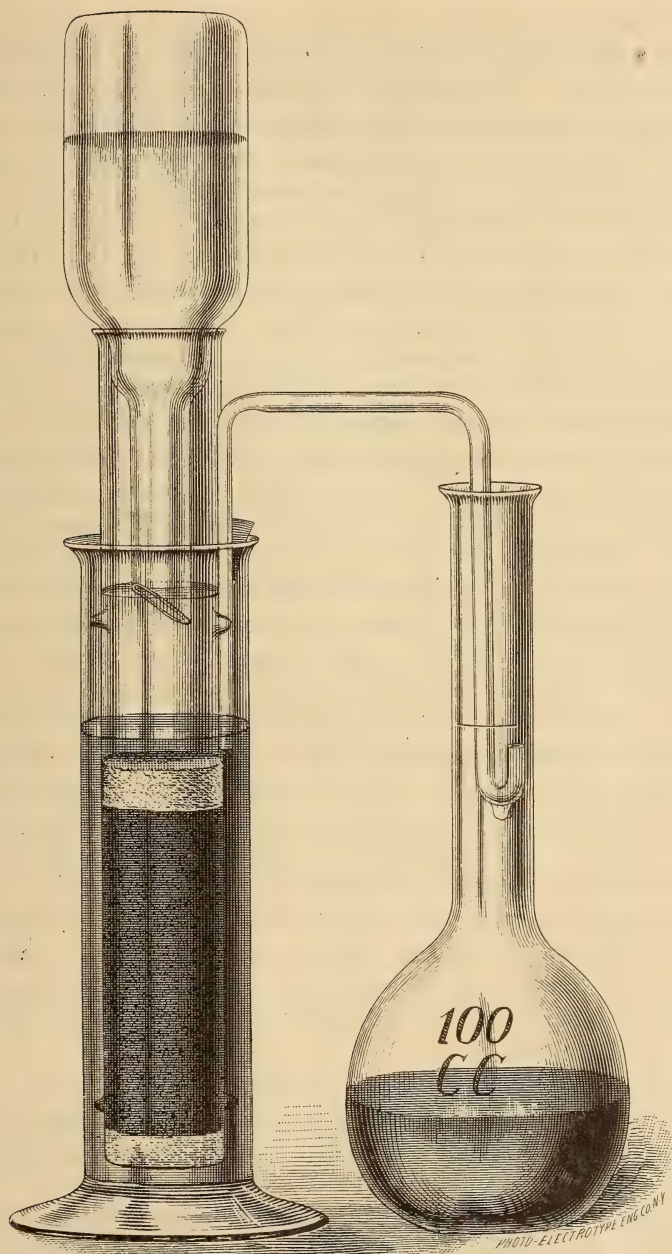
It was desirable to know with a fair degree of accuracy how much free acid an acetic acid fluid extract of cinchona with this menstruum would contain, and in the above-described three portions of fluid extract the proportion was found to be 11, 10.2 and 10 per cent., and where there had been most evaporation there was least free acid. The lowest of these proportions is quite sufficient to secure the stability and permanency of the preparations under all ordinary conditions. When this fluid extract is mixed with three or four times its volume of water, the mixture has the appearance of coffee with milk, and in this condition the taste of free acid is very slight and not disagreeable, and the conclusion is reached that in all discovered ways it is a better therapeutic agent and a more eligible preparation than the officinal fluid extract and at far lower cost.

THE ASSAY PROCESS FOR CINCHONA.

The cinchona should be in fine powder for complete exhaustion, and the harder the bark the finer the powder should be. The U.S.P. directs a No. 60 powder for its preparations, but No. 80 or finer for its assay process. The B.P. directs No. 60 for both preparations and assay. But the results obtained here by the use of 10 per cent. acetic acid as a menstruum show that complete exhaustion is easily obtained with a No. 9 powder for the assay process.

The apparatus and management are, however, of great importance in obtaining complete exhaustion if the residue is to be, as it should be, bitter-free when well chewed. This is so difficult and of so much importance that it appears to be worth while to offer a cut of an extractor that has been very successful in the extraction of nuxvomica and now in the still more difficult cinchona, and that is expected to be equally applicable to many other substances.

This simple apparatus is shown in operation. The flattened end



EXTRACTOR.

of the test-tube has five small holes that cannot be shown, and a small rubber band is better to hold the syphon in place than the wedge as shown. The apparatus is easily made up from laboratory materials by any fairly expert glass-worker, though it may be cheaper to pay Greiner a dollar and a half for it. It is simply a modification on a small scale of the writer's syphon percolator, now so many years in successful use, in all sizes up to 100 gallons (see *Proceedings of the Amer. Pharm. Assoc.* for 1872). It is the best form of percolator because it best applies the mechanical conditions requisite for complete exhaustion. That is, the whole mass of powder to be extracted is, from first to last, kept completely filled, inside the particles and between them, with the extracting menstruum and counterbalanced to an equilibrium by liquid that has already passed through the saturated powder. The syphon draws off the liquid from near the surface of this outer column at a rate controlled by the depth to which the end is immersed, and by the head of menstruum supplied to the powder on top. The inverted bottle of menstruum supplies a nearly continuous feed from a nearly constant level. The whole mass being full of liquid, the outside column nearly level with the inside supply, the syphon is filled, put in place and held in position, where by raising or lowering it is made to deliver from three to five drops per minute. Now, in this position the laws of hydrostatics require that the first drop that falls from the syphon sets the whole mass of liquid in motion, but with such extreme slowness in the powder that friction is reduced to a minimum, and the liquid in the particles descends at a rate approaching that between the particles, thus securing a displacement of the soluble parts of the powder with the least obstruction from the insoluble parts. If the rate of descent could be made so slow as to eliminate friction, then each stratum of solvent liquid would descend as a piston and complete exhaustion would be attained with the smallest quantity of solvent.

Ten grammes of the powdered cinchona in a capacious capsule is moistened with 10 c.c. of 10 per cent. acetic acid, the lumps all well broken up, the moist powder packed firmly in some form of percolator and percolated to complete exhaustion with 10 per cent. acetic acid. If this exhaustion be done in the extractor figured above, about thirty-six hours' time will be required and the percolate will measure 180 to 200 c.c. The degree of exhaustion is judged by the

degree of bitterness of the final percolate, which is not quite bitter-free when the cotton and the lower part of the powder is quite bitter-free though not tasteless.¹

The entire percolate is evaporated in a flat-bottom capsule to the condition of a soft solid when cold, capable of being stirred when hot. This extract usually weighs 35 to 38 per cent. of the cinchona and it retains a small amount of acetic acid. While heated on the water-bath, 30 c.c. of a previously made mixture of 5 volumes of 10 per cent. water of ammonia and 15 volumes of 91 per cent. alcohol is added, the mixture is stirred to a uniform condition and poured into a separator of 160 to 180 c.c. capacity. The capsule is rinsed into the separator with a mixture of 10 c.c. of the ammonia mixture and 10 c.c. of alcohol, and the whole is well shaken together. If much ammonia has been lost in dissolving the extract—if much acetic acid should have been retained in the extract, or if the cinchona should be very rich in alkaloids, the 40 c.c. of ammonia mixture may be insufficient to set the alkaloids free. This point is always to be assured by the smell of ammonia at the mouth of the separator, or by holding a strip of wet and neutral litmus paper in the air space of the separator. If the alkaline reaction be not full and prompt, 5 c.c. more of the ammonia mixture is added and the shaking and testing repeated.

Then 40 c.c. of chloroform (95 per cent.) is poured into the separator, the whole is vigorously shaken for five minutes and then allowed to separate. This separation requires ten to fifteen minutes and then the chloroform solution is drawn off into a tared flask of about 100 c.c. capacity, and is put upon the water-bath to boil off the chloroform. Then 5 c.c. of alcohol (91 per cent.) is added to the residue in the separator, is shaken in, and then a second 40 c.c. of chloroform is added, and the whole is again shaken for five minutes, allowed to separate, the chloroform drawn off into the tared flask

¹ In these percolations, especially when on a larger scale, it is difficult to get a bitter-free final percolate and residue, so that it was desirable to know how much bitterness was consistent with practical exhaustion. A solution of total alkaloids of cinchona of one part in 100,000 of water was made, and this was perceptibly though faintly and transiently bitter to several, but not to all ordinary tastes. This, therefore, is not bitter-free. One part in 10,000 was distinctly and rather permanently bitter, and as this is but 0.01 of 1 per cent., it is considered, on the large scale, as practical exhaustion.

with the first portion, and the whole of the chloroform boiled off in the bath. If the alcohol be omitted from the residue before this second washing, an emulsion is almost certain. The apparent excess of chloroform is necessary not so much for the washing out of the alkaloids as to avoid emulsion. The residue is run off from the separator into a beaker, is well stirred, five or six drops is transferred by the stirrer to the end of a strip of bibulous paper and dried on the bath. This, when taken into the mouth and well chewed, should be bitter-free.

The chloroform solution, when the chloroform, ammonia and alcohol are boiled off, leaves a very dark residue in the flask usually weighing about 1 gramme. This is dissolved in 20 c.c. of chloroform by shaking, and 10 c.c. of water added and shaken. Then 20 c.c. of decinormal sulphuric acid is run into the flask from a burette, shaken for five minutes and poured into a separator. When the liquids separate the lower, chloroform part, is drawn off into the flask again and the upper watery portion into a beaker. Then 10 c.c. more of decinormal acid and 5 c.c. of water are added to the contents of the flask, the whole well shaken for five minutes, returned to the separator, the flask rinsed in with 5 c.c. of water, and the whole well shaken in the separator. When the liquids separate, the lower chloroform residue is drawn off into a small beaker, and the watery portion into the beaker with the first watery portion. The chloroform residue is now tested by drying upon bibulous paper, as before described, and if found bitter-free it is thrown away, but if still bitter to the taste it is again washed.

To the acid-watery solution in the larger beaker 30 c.c. of decinormal potassium hydrate is added with stirring, the whole transferred to the separator, 25 c.c. of ether (96 per cent.) added and the mixture well shaken. When the liquids separate, 5 c.c. of decinormal alkali is poured into the separator, producing a large precipitate that is redissolved when shaken. This addition of decinormal alkali is repeated until one addition fails to produce cloudiness. Then the mixture is shaken for five minutes, allowed to separate and the lower watery liquid is drawn off into the larger beaker. The ether solution cannot be drawn off clean through the stopcock, but can be poured off through the mouth of the separator, to the last drop, into a tared beaker, leaving a little emulsion and water drops behind. To these residues in the separator 20 c.c. of ether is added

and well shaken, the watery solution from the large beaker added, again shaken for five minutes, allowed to separate, drawn off and poured off as before, and this washing is repeated a third time.

The watery portion is now tested and should be found bitter-free, or be again ether-washed. The ether solutions in the tared beaker are boiled off on the bath and leave a varnish-like residue of an amber color, consisting of total alkaloids and a little insoluble waxy matter. This is weighed in order to get the approximate percentage of alkaloids, and for each 1 per cent. of these crude alkaloids 5 c.c. of decinormal acid is run into the beaker from a burette and 10 c.c. of water added. But these alkaloids are difficult and slow to dissolve in the acid, so that time is saved by dissolving them in 3 or 4 c.c. of ether by rotary agitation before the acid is run in. When the acid is run in, the waxy and fatty matters are precipitated and a stirrer and warming are then used to free this precipitated matter from alkaloids and to drive off the ether. The alkaloids are thus converted into acid salts and dissolved, and the insoluble matters are deposited on the sides and bottom of the beaker. If the nearly clear solution be poured off and the beaker and residue be dried, weighed and the weight be subtracted from the weight of crude alkaloids, the remainder will be within 0.1 or 0.2 per cent. of the weight of pure alkaloids, and thus will be a useful check upon the titration that is to follow.

In the titration now to be described litmus paper is used as the indicator, and if the paper be good and be well managed the indication is sufficiently accurate, reaching to the second decimal place of percentage. The paper is used in strips 0.5 cm. wide, some of deep blue, some neutral, and about a centimetre of the end of the strip is wetted for the indication.

Decinormal potassium hydrate solution is dropped from a burette into the acid solution of the alkaloids with stirring and frequent testing until the solution fails longer to change blue litmus paper. When the blue strip is just touched to the surface of the solution, the liquid rises in the paper to about a centimetre. As the neutral point is approached the end will be blue with a red or reddish band above the blue, but when it is reached the whole wetted part will be unchanged blue. Then a strip of neutral litmus paper has the end wetted with distilled water for about a centimetre, and this end is just touched to the surface of the solution and held there for a

few seconds. On close inspection by reflected light no difference in tint between the lower and upper parts of the wetted portion will be discoverable. If this be the case, one or two drops more of the decinormal alkali is added and the testing repeated with a new strip of wetted neutral paper. Now, a small patch of faint bluish tint will be discoverable about the middle of the wetted portion, and this indicates as nearly as need be the point when all the acid salts have been reduced to neutral salts.

The number of cubic centimetres of decinormal alkali used to reach this point subtracted from the number of cubic centimetres of decinormal acid taken for the solution gives the number of cubic centimetres of the acid saturated by the alkaloids to form the neutral salts, and this number divided by 10 gives the amount of normal acid equivalent to the decinormal acid used. This multiplied by the normal molecular weight of the alkaloids would give the weight of alkaloids obtained from the 10 grammes of cinchona taken. But there are many alkaloids of different molecular weights in cinchona, so that it is impracticable to get a molecular weight that would accurately represent any sample of total alkaloids. Perhaps the best that can be done, as has often been done before, is to make an arbitrary composite combining number. All that can be said of this proceeding is that it is very convenient—that it admits of titration—that the results cannot be more than about 0.3 per cent. from the truth in rare cases, and that it is always closer than is the weighing of a chloroform or ether extract as total alkaloids.

The alkaloids of cinchona may be usefully divided into three groups:

- (1) The quinine group with a molecular weight of about 0.324.
- (2) The cinchonine group with a molecular weight of about 0.294.
- (3) The remaining alkaloids with a molecular weight of about 0.312.

Practically no cinchona for pharmaceutical uses should contain less than 5 per cent. of total alkaloids, and at least 2.5 per cent. of these should be of the quinine group, 1.25 per cent. of the cinchonine group, and 1.25 per cent. of the remaining alkaloids. This proportion being arbitrarily assumed gives a combining weight of 0.314 as follows:

Quinine group	$0.324 \div 2 = 0.162$
Cinchonine group	$0.294 \div 4 = 0.074$
Other alkaloids	$0.312 \div 4 = 0.078$

Adopted average molecular weight 0.314

This 0.314, then, is adopted as the factor for total alkaloids in this investigation, and an example will illustrate its use in this paper.

A recent critical assay of 10 grammes of cinchona by this process gave a varnish-like ether extract that weighed 0.53 gramme, equal to 5.3 per cent. of crude alkaloids. This indicated ($5 \times 5 =$) 25 c.c. of decinormal acid required for dissolving the alkaloids. But these were first dissolved in 4 c.c. of ether, then the acid run in from a burette, well stirred and warmed to drive off the ether and cause the insoluble matters to adhere to the glass.

Into this solution decinormal alkali was dropped from a burette with stirring until the neutral point was reached, as indicated by the use of the litmus paper strips, when it was found that 9.3 c.c. of decinormal alkali had been used. Then 25 c.c. of decinormal acid less 9.3 c.c. of decinormal alkali leaves 15.7 c.c. of the acid as saturated by the alkaloids. Then the result is expressed as follows:

$$15.7 \div 10 = 1.57 \times .314 = .49298 \times 10 = 4.9 \text{ per cent. alkaloids.}$$

The nearly clear solution was poured off from the residue in the beaker, and the residue when dried weighed 0.03 gramme. Then 0.53 gramme of ether extract or crude alkaloids less 0.03 gramme of waxy residue left 0.50 gramme of alkaloids, or 5.0 per cent. against 4.9 per cent. by the titration.

In the numerous assays of percolates for the purposes of this paper, a short cut was found which, without much sacrifice of accuracy, greatly reduced the time and labor required, and seems well adapted to pharmaceutical use.

Ten c.c. of the liquid preparation of cinchona is shaken in a separator, first with 20 c.c. of the ammonia-alcohol mixture, and then with 30 to 40 c.c. of chloroform, the liquids separated as in the preceding assay process, which is then followed up to the point of dissolving the chloroform extract in a fresh portion of chloroform in the flask. If the chloroform extract be under 1 gramme, 10 c.c. of fresh chloroform is sufficient for its solution in the flask, and to this is added 10 c.c. of decinormal acid. The flask is vigorously shaken, 10 c.c. of water added, the shaking repeated and the contents

poured into a separator. When separated the chloroform is drawn off into the flask again and the acid solution into a beaker. To the chloroform in the flask 2 c.c. of decinormal acid is added from the burette, well shaken, 5 c.c. water added, the shaking repeated, the whole returned to the separator, the flask rinsed in, and when separated the chloroform is drawn into a small beaker and the watery solution into the beaker with the first portion. The chloroform should then be bitter-free or be again washed. The watery solution in the beaker is now titrated with decinormal alkali.

This process answers fairly well even with the disturbing element of glycerin in the liquid, as when the U.S.P. menstruum is used, for the emulsion always formed can be titrated, and is broken up as the decinormal alkali is dropped in with vigorous stirring.

Some of the advantages claimed for this assay process are: (1) The complete and easy exhaustion of the cinchona, even when in coarse powder, by 10 per cent. acetic acid. (2) The success of the shaking out without emulsion by the use of large quantities of chloroform and very little water, and (3) by the control of loss by having all the residues bitter-free before they are thrown away.

THE ASSAY OF BELLADONNA LEAVES.¹

BY FRANK X. MOERK.

In the March issue of the *AMERICAN JOURNAL OF PHARMACY*, the writer, in an article on "The Assay of Belladonna Leaves and Some of its Preparations," called attention to the fallacy of Keller's assay process, and to the difficulty of extracting the leaves with 95 per cent. alcohol, and proposed a process in which complete extraction of the leaves with the official fluid extract menstruum (2 vols. alcohol and 1 vol. water) and completion of the assay with the entire quantity of extract was recommended. The objections to this process were stated to be the time required for its execution, and some difficulties due to the presence of so much extractive matter, namely, the emulsification of the alkaline extractions (corrected by the use of stearic acid), the separation of a pulverulent precipitate (removed by filtration) and the presence of chlorophyl in the alka-

¹Read at the Meeting of the Pennsylvania Pharmaceutical Association, June, 1899.

loidal residue, which occasionally interfered with the titration; the advantage of the process, the accuracy of the assay, were considered sufficient to make the first objection, practically the only one which at that time could not be corrected, appear insignificant.

Since the publication of the above paper, experiments have been in progress which tend to improve this assay process in several directions. In the first place, it was found that a menstruum made up of 90 parts by weight of 95 per cent. alcohol, and 10 parts by weight of 10 per cent. water of ammonia constituted a superior solvent; 200 c.c., by immediate percolation, extracting 20 grammes drug better than 300 c.c. of the menstruum previously used with frequent periods of maceration. The extract obtained from this percolate can be perfectly removed from the capsule and transferred to the separator by using 0.5 c.c. water of ammonia and 10 c.c. water in portions of 1 and 2 c.c. The presence of chlorophyll in the alkaloidal residue can be prevented by filtering the acid extractions, as was proved by the fact that in the twenty-two assays made in connection with this paper not a single instance was noted in which there was any difficulty in the final titration. The pulverulent precipitate mentioned in the previous article was not met with in these assays. What at first appeared to be an objection to the use of this solvent was the tendency to form persistent emulsions in the alkaline extractions which did not break upon the addition of stearic acid and agitation; this was remedied by stirring the emulsified layer with a piece of iron wire, upon the end of which a little stearic acid had been fused and allowed to cool; by drawing off the clear portion and repeating the operation several times, if necessary, almost the entire quantity of solvent can be separated; it may happen that the last portions of the emulsion will be so thick that further separation will not take place; in this case, by gentle agitation, mix the emulsion with the aqueous solution and, after allowing to separate, it will be found that the stearic acid will again perform its function. These various improvements give an assay process as follows:

Moisture.—Determined in 2 grammes at 100° C.

Assay proper.—A small, slightly conical percolator, about 8 inches long and 1 ¼ to 1 ½ inches diameter, is connected with a small piece of rubber tubing having a small piece of glass tubing attached; into this percolator introduce a plug of absorbent cotton of such size as

to practically fill up the neck of the percolator; compress the rubber tubing with a pinch-cock, to allow preparation for the percolation. Place 20 grammes of the powdered leaves in the percolator, add 50 c.c. menstruum [alcohol (95 per cent.), 180 grammes; water of ammonia (10 per cent.), 20 grammes] and stir with a heavy iron wire until a homogeneous mixture results, and in such a manner that the air-bubbles are brought as completely as possible to the surface; rinse the wire and sides of the percolator with 10 c.c. of the menstruum and allow percolation to proceed at once; add more menstruum from time to time in quantities of 20 to 30 c.c. until 200 c.c. have been used, allowing the portions to flow down the sides of the percolator to avoid stirring up of the drug. Collect the first portions of the percolate, about 100 c.c., in a porcelain dish of about 150 c.c. capacity, and the last portions in a beaker; place the dish with contents upon a water-bath, the temperature of which is kept at from 50° to 60° C., and as the solvent evaporates add the weaker percolate; continue heating until the odor of alcohol is no longer recognizable after stirring. Make a mixture of 0.5 c.c. water of ammonia and 10 c.c. water and use this in portions of 1 to 2 c.c. to soften the extract and transfer it to a separator (250 c.c. capacity), add 50 c.c. of an ether-chloroform mixture (ether 4 parts, chloroform 1 part by weight) and agitate; now add 25 c.c. acidulated water (2 c.c. H_2SO_4 , U.S.P., diluted with water to 500 c.c.), using this to rinse the dish from which the extract has been removed, agitate thoroughly, and after separation of the liquids allow the acid solution to run through a small filter (5.5 cm. in diameter) into a beaker; repeat with 15, 10 and 5 c.c. acidulated water. Collect the first three portions together, reserving the last portion to rinse the beaker containing the first portions; clean the separator, introduce the acid solutions, finally rinsing the beaker with 5 c.c. water, add 25 c.c. chloroform-ether (chloroform 2 parts, ether 1 part by weight) and 8 c.c. water of ammonia and agitate thoroughly (should an emulsion form, proceed as described in the earlier part of this paper); after separation transfer the chloroform-ether solution to a smaller separator (about 100 c.c. capacity) and repeat the extraction with 15, 10 and 5 c.c. of the solvent; while this last portion is separating, run the other portions through a small filter into a clean, dry flask of about 120 c.c. capacity; rinse the smaller separator with the last extraction and transfer to the

filter; the stem of the larger separator is rinsed with 5 c.c. of the solvent and this portion used to again rinse the smaller separator before transferring to the filter; now rinse the stem of the smaller separator with a few cubic centimetres of the solvent, allowing this portion to run into the filter, and wash the filter and funnel with several small portions of solvent. Any aqueous solution transferred to the smaller separator should be prevented from getting on the filter and the latter should be covered as much as possible to prevent evaporation of the solvent.

Distil off the solvent on a water-bath, warm until the odor of chloroform disappears, dissolve the residue in 5 c.c. ether, evaporate, redissolve residue in 5 c.c. ether, evaporate and heat until the odor of ether disappears; dissolve in 8 c.c. neutral alcohol, add 30 c.c. water and 3 drops hæmatoxylin solution and titrate with standardized HCl to the disappearance of any red shade or the formation of a pure yellow color.

The results of this process [(1) and (2)], compared with those obtained by the original process [(3) and (4)], show slightly higher results, particularly if differences in percentages of moisture are considered.

	Moisture (1) Per Cent.	Alkaloid (2) Per Cent.	Moisture (3) Per Cent.	Alkaloid (4) Per Cent.
Powdered leaves, B.	9.15	{ 0.4944 0.4997	9.15	{ 0.4839 0.4891
English cultivated	8.85	0.6312	8.40	{ 0.5996 0.6040
German cultivated	8.43	0.5155	7.60	{ 0.5155 0.5050
German wild, I	8.50	—	6.80	{ 0.4997 0.4997
German wild, II	8.60	0.4208	—	—
Powdered leaves, K.	7.60	0.3629	—	—

The knowledge that the solvent used in this process is homogeneous and perfectly miscible with water suggested the possibility of using an aliquot portion of a maceration to complete the assay, thus saving additional time. One of the most important objections to assay processes in which an aliquot portion is used to represent a definite weight of drug is the increase in weight of the solvent added, by the moisture and soluble matters taken up from the drug, and for which no allowance is made in some processes, or a uniform allowance is made for all samples of a drug regardless of the actual

quantities of moisture or extractive. In the following work an allowance of 2 grammes extractive was first made for 20 grammes drug, hence 98 grammes solvent were used; by making a moisture determination and also weighing the extract obtained from the aliquot portion of the solution, it is possible to make a correction for the presence of a different quantity of extractive; the extract obtained under the conditions of the assay process will contain approximately 15 per cent. moisture and 85 per cent. solid matter. By adding the percentages of moisture in the leaves and of dry extract and calculating to 20 grammes, there is obtained the total extractive taken up from the drug and this, added to the weight of the solvent used in the assay, will give the total amount of solution from which an aliquot part was used to complete the assay. From the tabular statement of results it will be noticed that the extractive in the samples examined varied from 3.5 to 4.5 grammes, instead of the 2 grammes first allowed, and the alkaloid found corrected for this gives figures closely agreeing with the results of the more lengthy total extraction processes.

Based upon the work as embodied in the table, the following shorter process is suggested, allowing 3.5 grammes for extractive:

Moisture.—Determined in 2 grammes leaves at 100° C.

Alkaloidal Assay.—20 grammes of powdered belladonna leaves are placed in a glass-stoppered bottle of 250 c.c. capacity and 96.5 grammes solvent [alcohol (95 per cent.), 90 parts; water of ammonia (10 per cent.), 10 parts] added; agitate frequently during one-half to one hour and filter through a plaited filter (15 cm. diameter) into a clean, dry flask, keeping the filter covered as much as possible to avoid evaporation. Weigh the flask with contents and transfer solution to a capsule of about 150 c.c. capacity, in which a small glass rod has been placed, and which have previously been weighed; weigh the emptied flask and note the difference in the two weights as that of the aliquot portion for the assay. Evaporate on a water-bath at a temperature of 50° C. until the extract, after cooling, can no longer be stirred with the glass rod; weigh the capsule and contents, thus ascertaining the weight of the extract from which the percentages of extract and dry extractive can be calculated [(6) and (7) of table]. Mix 0.5 c.c. water of ammonia and 10 c.c. water and use this in portions of 1 and 2 c.c. to soften the extract and transfer to the separator, and proceed according to directions previously given in this paper (page 322).

	Extractive allowed. (1)	Solvent added. (2)	Aliquot portion for assay. (3)	Drug represented by (3) (without correction) (3) ÷ 5.	Alkaloid found × 100 ÷ (4).	Extract from (3) × 100 ÷ (4).	Dry extractive in (6) (6) × 0.85.	Moisture in leaves. (8)	Calculated total extractive from 20 gms. drug (7) + (8) × 0.20	Total solution in assay (2) + (9).	Factor for correcting (5).	Corrected alkaloidal percentage (5) × (11).	Alkaloid by total extraction.
German a.	Gms. 2	Gms. 98	Gms. 58.520	Gms. 11.704	Per cent. 0.5033	Per cent. 14.95	Per cent. 12.71	Per cent. 4.228	Gms. 4.228	Gms. 102.228	Per cent. 1.0223	Per cent. 0.5145	Per cent.
German b.	2	98	60.700	12.140	0.5026	15.07	12.81	4.246	4.246	102.246	1.0225	0.5139	0.5155
Cultivated. a.	2	98	57.180	11.436	0.4967	14.43	12.26	4.138	4.138	102.138	1.0214	0.5073	
b.	2	98	59.400	11.880	0.5047	14.39	12.23	4.132	4.132	102.132	1.0213	0.5154	
English Cultivated. a.	2	98	54.450	10.890	0.6086	16.07	13.66	8.85	4.502	102.502	1.0250	0.6238	0.6312
b.	2	98	55.580	11.116	0.6151	16.01	13.61		4.492	102.492	1.0249	0.6304	
German Wild. I. a.	2	98	61.740	12.348	0.4856	11.01	9.36	8.50	3.572	101.572	1.0157	0.4932	0.4997
b.	2	98	61.280	12.256	0.4893	11.50	9.77		3.655	101.655	1.0165	0.4973	
German Wild. II. a.	0	100	53.380	10.676	0.3941	10.49	8.91	8.60	3.502	103.502	1.0350	0.4079	0.4208
b.	2	98	55.770	11.154	0.4055	11.03	9.37		3.594	101.594	1.0159	0.4120	
Powdered Leaves, B. a.	2	98	64.180	12.836	0.4835	10.62	9.03	9.15	3.636	101.636	1.0163	0.4914	0.4944
b.	2	98	66.200	13.240	0.4847	10.87	9.24		3.678	101.678	1.0168	0.4928	0.4997
Powdered Leaves, K. a.	3.5	96.5	69.260	13.852	0.3570	12.06	10.25	7.60	3.570	100.070	1.0007	0.3572	0.3629
b.	3.5	96.5	69.240	13.848	0.3570	12.27	10.43		3.606	100.106	1.0011	0.3573	

The assays in which one-half hour and one hour maceration was allowed are marked in the table *a* and *b* respectively; the statement made that the mixture of alcohol and ammonia is a superior solvent is confirmed by the slight differences noted in these duplicate assays.

BISMUTH SUBGALLATE; ITS HISTORY, CHEMICAL COMPOSITION AND PROPERTIES.

BY LYMAN F. KEBLER.

Research Committee E, Pharmacopœia Revision.

There are probably few chemicals around which there clusters so much that is interesting as bismuth subgallate. The interest manifests itself in the history of its preparation, its chemical composition and chemical properties, the rôle it has played in our patent laws, and its value as a therapeutic agent.

In 1841, H. Bley¹ prepared, described, analyzed and assigned a chemical formula to this compound. In order that there may not be any misunderstanding, those portions of the original communications or patents which are of especial interest will be reproduced in this paper. "Um gallussaures Wismuthoxid darzustellen, wurde eine Lösung von basisch—essigsurem Wismuthoxid in vieler überschüssiger Essigsäure nebst Salpetersäure mit einer warmer Lösung von Gallussäure im Ueberschuss versetzt, wodurch sich ein hellgelber Niederschlag erzeugte." On analysis he found the precipitate to contain 51.48 per cent. of bismuth oxide and assigned to it the following formula: $2\text{BiO} + \text{G} + 2 \text{aq.}$

The directions of Bley for preparing bismuth subgallate are not given in detail, yet the following method, based on his outlines, gave the writer a very good article. To 300 grammes of bismuth subnitrate, in a container, add 100 grammes of nitric acid (sp. gr. 1.38) and 350 grammes of 80 per cent. acetic acid, agitate and, when solution is effected, dilute with 8 litres of distilled water; mix well and add, while stirring, 200 grammes of gallic acid, previously dissolved in 8 litres of luke-warm, distilled water. Wash the resulting precipitate with distilled water by means of decantation, until the wash-water only slightly affects blue litmus paper. On draining and

¹ 1841, *Arch. der Pharm.*, 26, 169; Abstr. L. Gmelin's Hand-book of Chemistry, 1859, Vol. 12, p. 409.

properly drying the precipitate, a soft canary-yellow product was the result. It compared favorably with any commercial article, and an analysis showed it to contain 53.81 per cent. of bismuth oxide.

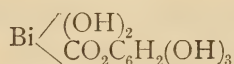
Fifty years later, B. Fischer¹ prepared the same article as follows: Dissolve 15 parts of bismuth nitrate crystals in 30 parts of glacial acetic acid, dilute with from 200 to 250 parts of water, and filter. To this filtrate add, with constant stirring, a warm solution of 5 parts of gallic acid dissolved in from 200 to 250 parts of water. The resulting precipitate is allowed to subside, the supernatant liquid decanted, the precipitate transferred to a strainer and washed with water until the wash-water no longer gives a reaction for nitrates with diphenylamine.

It is quite difficult to so thoroughly remove the nitrates from the bismuth subgallate by washing that the extremely searching reagent diphenylamine will no longer indicate their presence.

In 1897 two patents were taken out on bismuth subgallate, one in France and the other in the United States. The French patent covers a process for its manufacture, and intends the article to be used as a pigment. The American patent covers not only the process of manufacture, but the chemical product itself, even to the per cent. of bismuth it contains, and intends it as a therapeutic agent.

The French patent,² granted to "A la Compagnie parisienne de couleurs d'aniline," reads as follows: "48 kilogrammes de nitrate de bismuth neutre sont dissous dans de l'acide nitrique délayé, et cette dissolution est additionnée d'une dissolution de 19 kilogrammes d'acide gallique dans 40 litres d'alcool et 20 litres d'eau. Puis on ajoute de l'alcali caustique, de l'alcali carbonique on des corps similaires jusqu'à ce que la réaction ne soit plus que facilement acide; aussi l'addition d'acetate de soude, même l'addition d'eau, provoque la précipitation.

"Le précipité obtenu est du gallate du bismuth basique et a la formule



"La théorie demande 50.4 p. 100 de (Bi), nous avons trouvé 49.4 p. 100 de (Bi). Il se présente sous forme d'une poudre jaune, insoluble dans l'eau et dans des acides délayés.

¹ 1891, *Pharm. Ztg.*, p. 400; Abstr. in AMER. JOUR. PHARM., 63, 408.

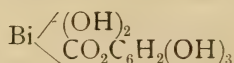
² 1891, Apr. 11, Brevet No. 212,712, Vol. 78, Part II, p. 44.

" Dans le procédé décrit, l'acide gallique peut être remplacé par n'importe lequel de ses sels neutres solubles dans eau."

About two and one-half months after the appearance of the above patent, application was made in this country for a patent on the same article. This, however, was only granted after a number of demurs. From the reading of the two patents it would seem that the American is a translated copy of the French brevet.

The United States patent,¹ granted to A. Liebrecht, two years after filing, reads as follows:

" Basic gallate of bismuth, a compound not known before. Forty-eight parts by weight of neutral nitrate of bismuth are dissolved in diluted nitric acid and thereto is added a solution of nineteen parts by weight of gallic acid in forty parts by weight of alcohol and twenty parts by weight of water. To the mixture is added caustic alkali, alkali carbonate, or the like, until the whole remains but slightly acid. On the addition of acetate of soda, and even on diluting with water, precipitation takes place. The precipitate thus obtained is basic gallate of bismuth having the formula:



Of bismuth, which according to theory should amount to 50.4 per cent., 49.4 per cent. are found in the product, which is in the form of a yellow powder insoluble in water and dilute acids. For the gallic acid in the above example may be substituted any of its neutral salts, which are soluble in water."

According to the patent, the exclusive right is given the patentee to the chemical name, even to the very percentage composition. In no other progressive country is such a thing possible.

From a reading of the above patents one is forced to the conclusion that the United States document is translated and copied almost verbatim, literatim, et punctatim. According to our patent laws a patent can be secured on anything new and useful, provided the same has not been patented or used for a period of more than two years prior to the date of application in this country. The copying of the French patent and securing a grant therefor in this country is, therefore, not illegal, but is, nevertheless, a questionable act.

¹ U. S. Patent No. 495,497, Apr. 18, 1893, filed June 25, 1891.

The history of the preparation of bismuth subgallate indicates that the United States patent would not stand long should opposition come. In due time the patent was attacked, and one manufacturer after another began to put the article on the market, yet, as far as the writer knows, the patent has neither been officially annulled, nor have the patentees maintained a rigorous legal defence. In consequence almost every manufacturer is supplying the article.

From this condition of affairs it might seem that articles of great variation would be met with in the channels of trade. This, however, is not the case with this article, as the following table will show :

No.	Physical Appearance.	Microscopical Appearance.	Per Cent. of Bismuth Oxide, Dried at 63° C.	Per Cent. of Volatile Matter at 110° C.	Reaction on Litmus Paper.	Solubility in 10 Per Cent. KOH.
1 . . .	Soft, bright yellow powder.	Amorphous.	53.40	2.8	Acid.	Soluble.
2 . . .	Soft, bright yellow powder.	"	53.38	3.2	"	"
3 . . .	Soft, bright yellow powder.	"	52.89	3.5	"	"
4 . . .	Soft, dull yellow powder.	"	54.26	5.56	"	"
5 . . .	Soft, bright yellow powder.	"	53.81	5.21	"	"
6 . . .	Soft, bright yellow powder.	"	52.73	2.6	"	"
7 . . .	Soft, bright yellow powder.	Amorphous and crystals.	54.63	2.4	"	"
8 . . .	Soft, bright yellow powder.	Amorphous.	53.37	3.6	"	"
9 . . .	Soft, bright yellow powder.	"	53.84	4.25	"	"
10 . . .	Soft, bright yellow powder.	"	53.72	2.91	"	"

The above data were obtained from samples collected in the Eastern United States, and represent the best manufacturers in this section. Dermatol is included. It is quite evident that the samples did not differ from one another very materially.

Nothing was removed by either alcohol or ether. All indicated the presence of nitrates with diphenylamine in a longer or shorter time. No arsenic was detected with Marsh's apparatus.

No. 7 contained many microscopical crystals. The process given by H. Causse¹ is said to yield a crystalline product. The method is, however, not suitable for practical purposes, and the writer is of the opinion that the above crystalline product was not obtained by this process. At all events, the amorphous is preferred, since it is less irritating to tender surfaces.

The reaction of bismuth subgallate on litmus paper appears to be anomalous. On treating this chemical with water, filtering and then ascertaining the reaction of the filtrate on litmus, it will generally be found neutral. But, if blue litmus paper be moistened and then laid on a small amount of the bismuth subgallate, it will be found that in a longer or shorter time an acid reaction will manifest itself.

The bismuth oxide was estimated² by ignition in a porcelain crucible and the reduced metal oxidized either by prolonged incineration or nitric acid or ammonium nitrate. It was found that prolonged heating gave results identical with those obtained by the use of either ammonium nitrate or nitric acid and with much less inconvenience. When nitric acid is used, great care must be exercised in evaporating all of the moisture before applying the burner, otherwise there will be loss by spirting, and in the cooling and reheating there is much danger in cracking the crucible. With ammonium nitrate there is less chance of loss by either spirting or breaking of crucible, but the writer much prefers to somewhat prolong the heating. With a little practice the operator can easily see when oxidation is complete.

The solubility of this bismuth salt in the fixed alkaline hydrates is a distinct advantage. Some claim that it is soluble in the alkaline carbonates also, but in this the writer has not been successful. There seems to be some solution, but not of such an extent as to be useful. Bismuth subnitrate is also soluble in a 10 per cent.

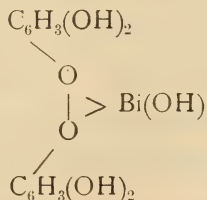
¹ 1893, *Comp. rend.*, 117, 232; *Chem. Ztg.*, 17, 216.

² Note—Since writing the above, Duyk (*Bull. Acad. Med. Belg.*) advises that the bismuth be estimated as an oxalate, since oxalic acid possesses the property of replacing all other acids in combination with bismuth. Bismuth oxalate ($\text{BiC}_2\text{H}_4\text{OH}$) theoretically contains 66.56 per cent. of bismuth, and it is claimed to be of quite constant composition, from whatsoever source obtained. Duyk advises the following procedure: Into a suitable vessel place about 1 gramme of the powdered substance, add from 30 to 40 centigrammes of oxalic acid, warm gently, add 100 c.c. of water, boil a few minutes and set aside. Collect the precipitate on a tared filter paper, wash with warm water and dry at 110° C.

solution of sodium hydrate, but very much more slowly than the bismuth subgallate. On heating, solution is much more rapidly effected, but this may be due to the hydrolising influence of the fixed alkali on the tannic acid, converting it into gallic acid. It must be stated, however, that one make of tannate is much more readily soluble than another. This may be due to a difference in the composition of the tannic acid employed.

The solubility of bismuth subgallate in sodium and potassium hydrate solutions is very striking and, naturally, the question is asked, why? On recalling to mind we find that bismuth subgallate is not the only bismuth compound, as commonly supposed, possessing this property; bismuth pyrogallate is just as readily soluble in the same alkaline solutions and otherwise possesses analogous properties. Bismuth subtannate was spoken of above. We have a similar phenomenon in the case of bismuth citrate and ammonium hydrate, in iron and ammonium citrate and many others.

There have been various chemical formulas assigned to this compound. H. Causse¹ found in his investigation that the salt lost two molecules of water, or 9 per cent., at 100° C., and assigns to it the formula $C_6H_2OHO_2CO_2Bi + 2H_2O$. He attributes the yellow color to the saturation of the phenol function of the acid. According to the above results, the bismuth subgallate supplied in this country is quite different from the article examined by Mr. Causse, for the highest amount of moisture obtained at 110° C. was only 5.56 per cent. Mr. Causse, however, probably worked with the crystalline article obtained by his process, yet the writer of this article also had one crystalline product, but its moisture was the lowest of any examined. There are some reasons for thinking that the yellow color may be due to the saturation of the phenol function, for instance, bismuth pyrogallate, whose formula is supposed to have the following configuration:



¹ 1893, *Comp. rend.*, 117, 232; *Chem. Ztg.*, 17, 276.

is yellow and readily soluble in the caustic solutions. But with phenol itself, bismuth forms a gray compound practically insoluble in sodium or potassium hydrate solutions.

The formula assigned by B. Fischer and B. Grützner is more nearly in accord with the results of this investigation. Their formula, $C_6H_2(OH)_3CO_2Bi(OH)_2 + H_2O$, requires the article to contain 54.23 per cent. of bismuth oxide; found in this investigation from 52.73 to 54.63 per cent. of bismuth oxide. This variation is due to different degrees of hydration.

Bismuth subgallate is a soft, light yellow, generally amorphous powder, of a somewhat variable composition (but may have some microscopic crystals), without odor or taste and permanent in the air; indifferent to light and may be sterilized at $100^{\circ}C$; insoluble in water, alcohol, ether or dilute acids; soluble in solutions of the fixed alkalies and strong inorganic acids. When incinerated in a porcelain crucible the residue may vary from 53 to 55 per cent. Neither alcohol nor ether should remove anything. One gramme, calcined in a porcelain crucible and dissolved in dilute sulphuric acid, should not give any indication of arsenic with Marsh's apparatus.

TINCTURE OF FAT-FREE DIGITALIS.¹

BY JOSEPH W. ENGLAND.

In 1892 I had the pleasure of presenting to this Association a paper on the subject of "Infusion of Digitalis." In discussing the chemistry of digitalis leaf, I stated then that the term digitalin had been given to a variety of products, but was generally reserved for the compound obtained by Schmiedeberg in 1875. The commercial digitalins, whether crystalline or amorphous, were stated to be varying mixtures of Schmiedeberg's digitalin, digitoxin, digitonin, digitalein, and certain decomposition products. Of these, all, save digitoxin, were believed to be glucosides. Including the decomposition products, these principles could be grouped into two classes, according to solubility. (1) Those soluble in alcohol, and insoluble or almost insoluble in water; (2) those soluble in both alcohol and water. Digitalin and digitoxin were assigned to the

¹ Read before the meeting of the Pennsylvania Pharmaceutical Association, held at the Philadelphia College of Pharmacy on June 14, 1899.

first class, and digitonin and digitalein to the second class; the tincture and fluid extract containing, most largely, digitalin and digitoxin, with some digitonin and digitalein, while the infusion contained digitonin and digitalein, with no digitalin or digitoxin. Hence the difference in clinical value between the aqueous and alcoholic preparations of digitalis leaves.

Reference was made to the superior therapeutic worth of the English leaves over the German, and this was ascribed to the fact that the English leaves were carefully freed from nerves and stalks (which had been shown to contain only one-fifth as much digitalin as the leaf parenchyma), thereby reducing the element of variability to a minimum. Since 1892, however, by personal advices received from London, the writer is convinced that much of the so-called English leaves are simply very carefully garbled German leaves, and not English cultivated leaves, as supposed.

Attention was also called to the fact that the freshly-made infusion was weakly acid in reaction, while the tincture gave the acid reaction more promptly, owing, probably, to a greater solubility of the acids of the leaf in alcohol, and the presence of a larger quantity in solution.

The acids present in digitalis leaves are the odorous antirrhinic acid of Morin (1845), and the fatty digitoleic acid of Kosmann, with which the digitaloic acid of Walz is probably identical. The percentage of fixed oil obtained was relatively high. By petroleum benzin exhaustion and spontaneous evaporation, I obtained, in 1887, about 5 per cent. The oil, or rather mixture, as there was evidently present both a volatile portion and a fixed oil, was a dark reddish brown liquid of a heavy persistently narcotic odor, largely soluble in alcohol, freely soluble in ether or chloroform, and not readily inflammable (showing the absence of traces of petroleum benzin). It left a permanently greasy stain on bibulous paper. Its specific gravity was about 0.850. Heated for eight hours it lost 5.4 per cent., and also lost its peculiar narcotic odor, becoming more fatty in character, indicating the loss of a volatile portion.

When tincture of digitalis is sometimes given, it causes profound gastric disturbance, even nausea and vomiting, and believing that, possibly, this might be due in part, if not wholly, to the fixed oil of the leaf and its free acids, the writer prepared, some years ago, a so-called fat-free tincture in which these two principles were eliminated.

Dr. Daniel E. Hughes, Chief Resident Physician of the Philadelphia Hospital, has kindly furnished me with the following clinical statement:

"For the past five years we have been using in the wards of the Philadelphia Hospital the tincture of fat-free digitalis made by Joseph W. England, the Chief Druggist of the hospital, to replace the official tincture. The vast majority of the cardiac and nephritic patients coming to the Philadelphia Hospital, have had, as a marked and stubborn complication, chronic gastric catarrh, and could not stand the administration of the official digitalis tincture, but could take our more bulky infusion. To secure the desired cardiac and nephritic action of this valuable drug required large doses of the infusion, which was a very serious drawback to its use.

"Mr. England's attention was called to the subject, and he suggested that he might be able to prepare a tincture of digitalis of the same strength as the official preparation, but devoid of the nauseating proximate principles of the latter. He prepared his preparation and we submitted it to extended employment. After the continued use of this particular preparation of digitalis, I can speak of its efficiency and non-nauseating properties. I am confident that it is much more promptly absorbed than the official tincture, and this makes the cumulative action of this drug almost, if not altogether, *nil*. Again, its more prompt absorption is shown by its quicker action upon the heart and increase in the flow of the urine.

"The non-irritating properties of this special tincture of digitalis are forcibly shown upon its hypodermic use, abscesses having never followed its use, while the official tincture almost invariably causes pain, swelling and abscess-formation on hypodermic use."

This fat-free tincture of digitalis was made by exhausting the leaves, while freshly ground (to a No. 60 powder), with purified petroleum benzin, either by maceration with solvent in excess for forty-eight hours, if in small quantity, or by maceration and subsequent percolation, if in larger quantity, repeating the solvent treatment until all the fat, etc., is removed. The residue is then dried by exposure to air, taking care that no traces of benzin odor remain. While benzin is very volatile, the last portions of it volatilize rather slowly, relatively, when spontaneously evaporated, especially if adherent to vegetable structure. Exposure of the residue to the sunlight, as well as to open air, yields the best results.

After the benzin treatment the dried and powdered leaves are made into a tincture according to the process for the official product, 150 grammes of leaves being used to make 1,000 c.c. with diluted alcohol, with this difference, that the receiver is removed when the total percolate amounts to about 980 c.c., and it is then carefully neutralized with a sufficient quantity (about 10 or 15 c.c.) of the official 10 per cent. ammonia water, and the product is made to measure 1,000 c.c. with sufficient fresh percolate or diluted alcohol.

Or, with the usual weights and measures, 1,094 grains of the powdered leaves may be exhausted with diluted alcohol to yield 15½ fluidounces, and then about 1 or 2 fluidrachms of 10 per cent. ammonia water will be required to effect neutralization, after which sufficient percolate, or diluted alcohol, should be added to make the whole product measure 1 pint. After standing for twenty-four hours the freshly-made tincture usually precipitates some coloring matters, etc., which should be removed by filtration through paper.

The product, as finally obtained, is a deep reddish brown, almost black liquid, keeping perfectly for years, of not unpleasant odor, and pure bitter taste. It has not the acrid odor or taste of the official tincture, and, unlike the latter, does not become turbid on admixture with water, but remains transparent with any amount of dilution.

The purposes of this procedure are two-fold: First, the benzin treatment removes the fat, and probably all the nauseating and odorous principles, and secondly, the ammonia treatment neutralizes the free acids present in the leaf, forming ammonium salts.

It does more than this. The neutralization with ammonia makes *all* the proximate principles in the tincture water-soluble, and not partly so as in the official product. (When the official tincture is diluted with water it precipitates.) This is especially valuable for the reason that all compounds before absorption by tissues must first be made soluble before they can be absorbed. By this means absorption is facilitated and assimilation is hastened, as will be shown by pharmacological results later.

When the fat-free tincture was first made, the desire was to obtain a preparation that would not nauseate, and clinical results in the Philadelphia Hospital have shown that this object has been very

generally accomplished. A short time ago, however, an even more valuable feature of the fat-free tincture became evident; this was the *rapidity* with which the preparation was absorbed and assimilated in comparison with the official product. Observations were then made to determine, clinically, the relative rapidity with which the fat-free tincture and the official tincture were each absorbed, noting (1) the time of primary effect; (2) the time of maximum effect, and (3) the pulse reduction or work, both in male and female patients, and both hypodermically and by mouth.

Through the kindness of Dr. F. A. Sherrer, formerly of this city (now of Hazleton, Pa.), this work has been done. The main difficulty was experienced in the selection of bed-cases in which, while the use of digitalis was indicated, the physical conditions were as nearly *uniform* as possible, so that comparative results could be had. The cases chosen were mostly rheumatic with endocarditis. In one or two cases there was arrhythmia, which disappeared in fifteen minutes after the first dose. Patients were given the tinctures three hours after meals, when the stomach was practically empty. The fat-free tinctures one day, the official the next day. No food or water was taken during the time of administration. The beginning of each administration was so timed that there was no serious difference between the rate of pulse-beat when the giving of each preparation was commenced. At most, the primary difference was never more than six beats. It is obvious that if a heart is beating almost normally one day, when one tincture is given, and is beating tumultuously the next day when another tincture is used, that uniform conditions do not exist and comparative results cannot be had. The next essential is rest in bed, and perfect quiet.

Speaking of this in connection with digitalis administration, Dr. H. C. Wood writes (U. S. D., 1898, 478):

"Whilst the patient is in a horizontal position the pulse is very slow and strong, but when he rises to his feet it becomes at once rapid, irregular, small and feeble, and even hobbling."

Doubtless, sphygmographic tracings would have determined the results of *rapidity* of absorption and action more accurately, but as this means of observation was not available, it was not followed. A few preliminary trials made by the mouth showed that primary effects were had with the fat-free tincture in about fifteen minutes, and primary effects with the official tincture in about thirty minutes; so observations of pulse-beats were taken every fifteen minutes.

In those cases where there was tenderness after hypodermic injection and possibility of abscess-formation, this was aborted by local application of the following ointment:

Silver Nitrate	20 gr.
Sulphur, Sublimed	20 gr.
Ichthyol	1 dr.
Cerate	4 dr.
Hydrous Wool Fat	4 dr.

The samples of the tinctures used are submitted. They were both made from Allen's digitalis leaves; the fat-free tincture in January, 1898, the official in September, 1898. The following are the results obtained:

Case 1.—Male patient, tinctures given by *mouth*, doses 10 minims.

FAT-FREE TINCTURE. March 29, 1899. Pulse.	TIME.	OFFICIAL TINCTURE. March 30, 1899. Pulse.
90	3.45 P.M.	86
88	4.00 P.M.	86
88	4.15 P.M.	82
86	4.30 P.M.	82
84	4.45 P.M.	80
82	5.00 P.M.	80

Fat-Free Tincture.—Primary effect in 15 minutes, full effect in 75 minutes; pulse reduction or work, 8 beats.

Official Tincture.—Primary effect in 30 minutes, full effect in 60 minutes; pulse reduction or work, 6 beats.

Case 2.—Male patient, tinctures given by *mouth*, doses 10 minims.

FAT-FREE TINCTURE. April 1, 1899. Pulse.	TIME.	OFFICIAL TINCTURE. April 2, 1899. Pulse.
78	3.45 P.M.	80
74	4.00 P.M.	80
73	4.15 P.M.	78
72	4.30 P.M.	76
71	4.45 P.M.	73
71	5.00 P.M.	72

Fat-Free Tincture.—Primary effect in 15 minutes, full effect in 60 minutes; pulse reduction or work, 7 beats.

Official Tincture.—Primary effect in 30 minutes, full effect in 75 minutes; pulse reduction or work, 8 beats.

Case 3.—Male patient, tinctures given by *mouth*, doses 10 minims. Same patient as Case No. 1.

FAT-FREE TINCTURE. April 5, 1899. Pulse.	TIME.	OFFICIAL TINCTURE. April 6, 1899. Pulse.
52	10.15 A.M.	52
49	10.30 A.M.	52
48	10.45 A.M.	50
48	11.00 A.M.	49
47	11.15 A.M.	48
47	11.30 A.M.	48
47	11.45 A.M.	47
48	12.00 M.	47
50	12.15 P.M.	50

Fat-Free Tincture.—Primary effect in 15 minutes, full effect in 60 minutes; pulse reduction or work, 5 beats.

Official Tincture.—Primary effect in 30 minutes, full effect in 90 minutes; pulse reduction or work, 5 beats.

Case 4.—Male patient, tinctures given by *mouth*, doses 10 minims. Same patient as Case No. 1.

FAT-FREE TINCTURE. April 6, 1899. Pulse.	TIME.	OFFICIAL TINCTURE. April 7, 1899. Pulse.
76	3.30 P.M.	78
72	3.45 P.M.	78
70	4.00 P.M.	75
68	4.15 P.M.	74
70	4.30 P.M.	74
74	4.45 P.M.	72

Fat-Free Tincture.—Primary effect in 15 minutes, full effect in 45 minutes; pulse reduction or work, 8 beats.

Official Tincture.—Primary effect in 30 minutes, full effect in 75 minutes; pulse reduction or work, 6 beats.

Case 5.—Male patient, tinctures given by *mouth*, doses 10 minims. Same patient as Case No. 2.

FAT-FREE TINCTURE. April 8, 1899. Pulse.	TIME.	OFFICIAL TINCTURE. April 9, 1899. Pulse.
60	9.00 A.M.	54
58	9.15 A.M.	54
57	9.30 A.M.	52
54	9.45 A.M.	50
54	10.00 A.M.	49
57	10.15 A.M.	49

Fat-Free Tincture.—Primary effect in 15 minutes, full effect in 45 minutes; pulse reduction or work, 6 beats.

Official Tincture.—Primary effect in 30 minutes, full effect in 60 minutes; pulse reduction or work, 5 beats.

Case 6.—Male patient, tinctures given *hypodermically*, 10-minim doses. Same patient as Case No. 2.

FAT-FREE TINCTURE.	TIME.	OFFICIAL TINCTURE.
April 17, 1899. Pulse.		April 18, 1899. Pulse.
58	9.30 A.M.	54
54	9.45 A.M.	54
47	10.00 A.M.	50
46	10.15 A.M.	50
46	10.30 A.M.	49
48	10.45 A.M.	51
48	11.00 A.M.	52

Fat-Free Tincture.—Primary effect in 15 minutes, full effect in 45 minutes; pulse reduction or work, 12 beats.

Official Tincture.—Primary effect in 30 minutes, full effect in 60 minutes; pulse reduction or work, 5 beats.

Case 7.—Male patient, tinctures given *hypodermically*, doses 10 minims.

FAT-FREE TINCTURE.	TIME.	OFFICIAL TINCTURE.
May 11, 1899. Pulse.		May 12, 1899. Pulse.
80	9.45 A.M.	80
78	10.00 A.M.	80
74	10.15 A.M.	78
70	10.30 A.M.	75
70	10.45 A.M.	74
70	11.00 A.M.	74
72	11.15 A.M.	76

Fat-Free Tincture.—Primary effect in 15 minutes, full effect in 45 minutes; pulse reduction or work, 10 beats.

Official Tincture.—Primary effect in 30 minutes, full effect in 60 minutes; pulse reduction or work, 6 beats.

Case 8.—Male patient, tinctures given *hypodermically*, doses 10 minims.

FAT-FREE TINCTURE.	TIME.	OFFICIAL TINCTURE.
May 14, 1899. Pulse.		May 15, 1899. Pulse.
80	9.00 A.M., 9.45 A.M.	80
77	9.15 A.M., 10.00 A.M.	80
74	9.30 A.M., 10.15 A.M.	78
72	9.45 A.M., 10.30 A.M.	74
74	10.00 A.M., 10.45 A.M.	72
74	10.15 A.M., 11.00 A.M.	76
78	10.30 A.M.	—

Fat-Free Tincture.—Primary effect in 15 minutes, full effect in 45 minutes; pulse reduction or work, 8 beats.

Official Tincture.—Primary effect in 30 minutes, full effect in 60 minutes; pulse reduction or work, 8 beats.

Case 9.—Male patient, tinctures given by *mouth*, doses 10 minims.

FAT-FREE TINCTURE. May 20, 1899.	TIME.	OFFICIAL TINCTURE. May 21, 1899.
Pulse.		Pulse.
54	10.00 A.M., 9.15 A.M.	54
48	10.15 A.M., 9.30 A.M.	52
48	10.30 A.M., 9.45 A.M.	48
46	10.45 A.M., 10.00 A.M.	48
46	11.00 A.M., 10.15 A.M.	44 (asleep)
50	11.15 A.M., 10.30 A.M.	44
52	11.30 A.M., 10.45 A.M.	46

Fat-Free Tincture.—Primary effect in 15 minutes, full effect in 45 minutes; pulse reduction, 8 beats.

Official Tincture.—Primary effect in 15 minutes, full effect in 60 minutes; pulse reduction, 10 beats. This is the only case in which primary effect took place in 15 minutes with the official tincture, and as the patient was in an especially quiescent state preparatory to sleeping, the tincture had less work to do than usual, and did it more quickly. The marked reduction of pulse beats is due to the same cause.

Case 10.—Male patient, tinctures given by *mouth*, doses 10 minims.

FAT-FREE TINCTURE. May 20, 1899.	TIME.	OFFICIAL TINCTURE. May 21, 1899.
Pulse.		Pulse.
70	10.00 A.M., 9.30 A.M.	66
68	10.15 A.M., 9.45 A.M.	66
64	10.30 A.M., 10.00 A.M.	64
66	10.45 A.M., 10.15 A.M.	66
72	11.00 A.M., 10.30 A.M.	68

Fat-Free Tincture.—Primary effect in 15 minutes, full effect in 30 minutes; pulse reduction or work, 6 beats.

Official Tincture.—Primary effect in 30 minutes, full effect in 30 minutes; pulse reduction or work, 2 beats.

Case 11.—Female patient, tinctures given by *mouth*, doses 10 minims.

FAT-FREE TINCTURE. May 21, 1899. Pulse.	TIME.	OFFICIAL TINCTURE. May 22, 1899. Pulse.
67	9.30 A.M.	61
62	9.45 A.M.	62
70	10.00 A.M.	59
68	10.15 A.M.	66
68	10.30 A.M.	65
64	10.45 A.M.	60
60	11.00 A.M.	59
58	11.15 A.M.	52
70	11.30 A.M.	64

Fat-Free Tincture.—Primary effect in 15 minutes, full effect in 105 minutes; pulse reduction or work, 9 beats. The up-and-down character of these results shows that there must have been some disturbing factor introduced, such as disturbance of rest, etc., and the time required for full effect cannot fairly be considered.

Official Tincture.—Primary effect in 30 minutes, full effect in 105 minutes; pulse reduction or work, 9 beats.

Case 12.—Male patient, tinctures given by *mouth*, doses 10 minims.

FAT-FREE TINCTURE. May 23, 1899. Pulse.	TIME.	OFFICIAL TINCTURE. May 24, 1899. Pulse.
70	9.45 A.M.	68
66	10.00 A.M.	68
66	10.15 A.M.	64
64	10.30 A.M.	62
64	10.45 A.M.	60
68	11.00 A.M.	60

Fat-Free Tincture.—Primary effect in 15 minutes, full effect in 45 minutes; pulse reduction or work, 6 beats.

Official Tincture.—Primary effect in 30 minutes, full effect in 60 minutes; pulse reduction or work, 8 beats.

Case 13.—Male patient, tinctures given by *mouth*, doses 10 minims.

FAT-FREE TINCTURE. May 23, 1899. Pulse.	TIME.	OFFICIAL TINCTURE. May 24, 1899. Pulse.
72	9.45 A.M.	72
70	10.00 A.M.	72
64	10.15 A.M.	68
62	10.30 A.M.	66
64	10.45 A.M.	—

Fat-Free Tincture.—Primary effect in 15 minutes, full effect in 45 minutes; pulse reduction or work, 10 beats.

Official Tincture.—Primary effect in 30 minutes, full effect in 45 minutes; pulse reduction or work, 6 beats.

Case 14.—Female patient, tinctures given by *mouth*, doses 10 minims.

FAT-FREE TINCTURE. May 25, 1899.	TIME.	OFFICIAL TINCTURE. May 24, 1899.
Pulse.		Pulse.
67	9.30 A.M.	66
65	9.45 A.M.	66
66	10.00 A.M.	68
64	10.15 A.M.	64
64	10.30 A.M.	66
64	10.45 A.M.	64
64	11.00 A.M.	62
66	11.15 A.M.	60

Fat-Free Tincture.—Primary effect in 15 minutes, full effect in 45 minutes; pulse reduction or work, 3 beats.

Official Tincture.—Primary effect in 45 minutes, full effect in 105 minutes; pulse reduction or work from commencement, 6 beats.

Case 15.—Female patient, same patient as Case 14, tinctures given by *mouth*, doses 10 minims.

FAT-FREE TINCTURE. May 26, 1899.	TIME.	OFFICIAL TINCTURE. May 27, 1899.
Pulse.		Pulse.
68	10.00 A.M.	65
66	10.15 A.M.	65
63	10.30 A.M.	75
64	10.45 A.M.	61
60	11.00 A.M.	63
61	11.15 A.M.	63

Fat-Free Tincture.—Primary effect in 15 minutes, full effect in 60 minutes; pulse reduction or work, 8 beats.

Official Tincture.—Primary effect in 45 minutes, full effect in 45 minutes; pulse reduction or work from commencing pulse-beat, 4 beats.

SUMMARY OF RESULTS.

CASE.	FAT-FREE TINCTURE.			OFFICIAL TINCTURE.		
	First Effect, Minutes.	Full Effect, Minutes.	Work or Beats Reduced.	First Effect, Minutes.	Full Effect, Minutes.	Work or Beats Reduced.
1.	15	75	8	30	60	6
2.	15	60	7	30	75	8
3.	15	60	5	30	90	5
4.	15	45	8	30	75	6
5.	15	45	6	30	60	5
6 h.	15	45	12	30	60	5
7 h.	15	45	10	30	60	6
8 h.	15	45	8	30	60	8
9.	15	45	8	15 ¹	60	10
10.	15	30	6	30	30	2
11.	15	—	9	30	105	9
12.	15	45	6	30	60	8
13.	15	45	10	30	45	6
14.	15	45	3	45	105	6
15.	15	60	8	45	45	4
Averages . . .	15	49	7.6	31	66	6.4

h—hypodermic cases; others, by mouth.

¹ Exceptional case. Explained in text.

Twelve of the above patients were male and three female. In twelve of the cases the tinctures were given by the mouth, and in three, hypodermically, which latter are so marked.

From these results it may be said that, practically, the primary effects of the fat-free tincture were manifested in 15 minutes, and the maximum in 45 minutes; while, with the official tincture, primary effects were evidenced in 30 minutes, and the maximum in 60 minutes. In both cases, however, the *duration* of effect was the same—30 minutes. The pulse reduction, or work done, was slightly greater with the fat-free tincture than with the official. The most striking difference, however, exhibited between the fat-free tincture and the official tincture was the *much greater rapidity of absorption* and action of the former—showing a more speedy assimilation of the fat-free product. The time element of drug action is a very important matter in some cases, and might readily mean, with a

digitalis preparation, the difference between the life and death of a patient. No especial difference in the time of absorption between *hypodermic* injections and *mouth-administrations* was observable, but when the tincture was given hypodermically the pulse-reduction seems to have been greater with the fat-free tincture, though not extending over any greater length of time.

It would be unwise to draw too far-reaching conclusions from these results. Based, as they are, upon clinical conditions, and varying, as these do, with the personal factor in each case, they should be considered as approximate for the present, until supplemented by more extended work with the sphygmograph. At the same time, the remarkably concordant results gotten in the majority of cases, both with the fat-free tincture and the official, would seem to be fairly indicative of a number of conclusions.

RECENT LITERATURE RELATING TO PHARMACY.

ASSAY OF FLUID EXTRACT OF HYDRASTIS.

A new method of assay is suggested by N. Rusting (*Ph. Cent.*, 1898, 788). It consists of cooking 10 grammes of the fluid extract with 20 grammes water until the liquid is evaporated to 20 grammes, and filtration of the residue through infusorial earth or talc. Ten grammes of the filtrate is mixed with 25 c.c. ether and 3 c.c. ammonia water, and after shaking, 25 c.c. petroleum ether and 2 grammes tragacanth are added. Forty c.c. of the ethereal layer is then withdrawn and evaporated to 15 c.c., when the hydrastin crystallizes out, and is weighed. The tragacanth aids in the separation of the ethereal layer and the evaporation of 25 of the 40 c.c. of the ethereal liquid removed all the ether, leaving the petroleum ether, in which hydrastin is scarcely soluble. In fact, when the petroleum ether is separated from the crystals and evaporated, the residue is found to contain only canadine. Comparison of this method of assay with that of Linde (*Ph. Cent.*, 1895, 353), shows the two methods agree well with advantage in simplicity and quickness in favor of Rusting's process.

H. V. ARNY.

A NEW METHOD FOR THE DETERMINATION OF THE MELTING-POINTS OF FATS.

Messrs. H. R. Le Sueur and A. W. Crossley, having experienced some difficulty in securing uniform results by the usual methods,

devised a very simple method that proved very satisfactory in their hands. The underlying principle of the method is that liquids show the phenomenon of capillarity, while solids do not. The melting-point is determined in the following manner (*see Fig. 1*): Into a thin-walled tube, *A*, closed at one end, place a fine capillary tube, *B*, open at both ends, then small particles of the substance under examination are placed into the outer tube, so that the lower end of the capillary tube is well surrounded by it. The whole is then attached to a thermometer by means of two rubber bands, *CC*, and then placed into a suitable medium, which is slowly heated and carefully stirred. The temperature at which the liquid is seen to rise in the capillary tube is taken as the melting-point of the fat. The usual precautions for taking melting-points must be observed.—1898, *Four. Soc. Chem. Ind.*, 17, 988.

L. F. KEBLER.

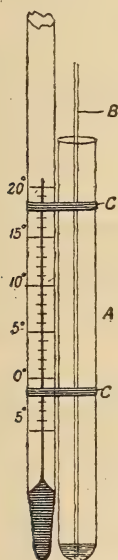


FIG. 1.

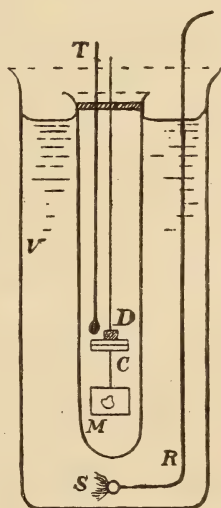


FIG. 2.

APPARATUS FOR DETERMINING MELTING-POINTS.

L. N. Vandevyver, 1898, *Ann. Chim. anal. appl.*, 13, 397; from *Four. Soc. Chem. Ind.*, 1899, 18, 298. (*Fig. 2*.)

In this apparatus a wire rod is provided with a mirror, *M*, fixed at an angle of 135° , and two rings, one, *C*, which is fixed, and the other, *D*, which is movable. Between these two rings is clamped

a piece of filter-paper, on which is placed a particle of the substance to be examined. The rod, with its appendages, and a delicate thermometer, are then fixed in a test-tube by means of a cork, as shown in accompanying cut. The whole is then placed into a beaker, *V*, containing water, glycerine or paraffin, in which is a stirrer, *R*, provided with a brush to remove adhering bubbles. The whole is then carefully heated, and the melting-point determined by observing the reflection by the mirror of the stain produced on the paper by the substance, on melting. A dull glass disk is to replace the paper, if a substance produces a stain at the ordinary temperatures. For material having high melting-points, the glass mirror can be replaced by a metallic one.

L. F. K.

EDITORIAL.

PENNSYLVANIA PHARMACEUTICAL ASSOCIATION.

It has been customary in the July issue of this JOURNAL to devote considerable space to the proceedings of the Pennsylvania Pharmaceutical Association. Inasmuch as the meeting this year was held in the city of Philadelphia, which has been referred to as "the Birthplace of Liberty," and in the Philadelphia College of Pharmacy, which has been considered to be "the cradle of American pharmacy," we gladly devote a little more than usual attention in these pages to the transactions of this meeting. There were many commendable features of this meeting, as will be seen on reading the report of the proceedings in another part of this JOURNAL. The President's address, like that of his predecessor, may be said to have been devoted to a sound and judicious consideration of the problems concerning the practical and commercial side of pharmacy to-day.

The reports of the various committees, particularly that of the Chairman of the Committee on Legislation, indicated that strong efforts are being made to ameliorate the existing conditions in regard to product patents. The N. A. R. D. received much encouragement on every hand. The officers of this organization must realize their great responsibilities, and that they received much encouragement from the various organizations, pharmaceutical press and other avenues of influence. It is to be hoped that all their future actions will be, as the President suggested, as wise and conservative as they have been in the past.

There were an unusually large number of good papers presented, quite a number of which are printed in this issue of this JOURNAL. The Entertainment Committee, while it did not contribute any papers or reports, did a most important work, which required a great amount of time and special ability, in providing for the comfort of the members, and it may be said, to a certain extent, the fuel which enabled so much work to be done so easily. The work of the Association and its pleasures were admirably divided, and the adage that "There is a time to play and a time to work" was well adhered to, so that the amount of business transacted in two days was unusually great, and the amount of pleasure realized during the remaining time was more than usual.

REVIEWS AND BIBLIOGRAPHICAL NOTICES.

FORMULAIRE DES MÉDICAMENTS NOUVEAUX POUR 1899. Par H. Bocquillon-Limousin. Introduction par le Dr. Huchard. 1 vol. in-18 de 324 pages, cartonné. 3 francs.

This formulary of the new medicaments is a valuable addition to this subject. Besides the consideration of a large number of plants recommended by therapeutists, there will be found a consideration of nearly all the recently introduced chemicals, etc.

Among these may be mentioned: Benzeucaine, Captol, Céarine, Cosaprine, Créosolide, Eigone, Erythrol, Euphtalumine, Gaïacyl, Glycéro-phosphate de quinine, Guaïaquine, Guéthol, Hydrargyrol, Ingestol, Iodamylum, Iodocaséine, Iodogallicine, Iodoterpine, Largin, Oléates alcaloïdiques et métalliques, Orthophosphate d'argent, Oxoles, Phosphate de bismuth, Protargol, Quinochloral, Saligallol, Salicylate de mercure dissimulé, Saliformine, Satitannol, Styron, Tannone, Thiocol, Ursal, Valerydine, Validol, Vanadine.

Of all the medicines treated there are given the synonyms, description, physical and therapeutical properties, mode of administration and dose. The work has been scientifically and accurately done, and is to be recommended as an important addition to the literature of newer remedies.

THREE THOUSAND QUESTIONS ON MEDICAL SUBJECTS, ARRANGED FOR SELF-EXAMINATION.—With the proper references to standard works in which the correct replies will be found. Second Edition, enlarged. Philadelphia: P. Blakiston's Son & Co., 1012 Walnut Street.

The ideas are excellent ones, and the questions are well gotten up. The only unfortunate thing is that the "Standard works in which correct replies will be found" are, in fourteen out of the sixteen books of reference mentioned, all Quiz Compendes. It would have been well if some of the standard works other than "Quiz Compendes" were referred to.

DRS. HARVEY AND DAVIDSON'S SYLLABUS OF MATERIA MEDICA.—Revised in accordance with the "British Pharmacopœia," 1898. By William Martindale. Tenth edition. London: H. K. Lewis, 136 Gower Street, W. C. 1898.

This little book of sixty-four pages was originally prepared for the use of the medical students in the University of Aberdeen. It seems to be employed by medical students as a guide in their studies of the more important articles and preparations in the B. P.

PENNSYLVANIA PHARMACEUTICAL ASSOCIATION.

The twenty-second annual meeting of the Pennsylvania Pharmaceutical Association convened at the Philadelphia College of Pharmacy on Tuesday morning, June 13th, 1899, at 10 o'clock, with the President, Mahlon N. Kline, in the chair. The Association was welcomed on behalf of the city of Philadelphia by Mayor Ashbridge, who, in a very pleasant address, referred to the fact that the first salary he ever received was in the wholesale drug house of Robert Shoemaker & Co., of this city, and that he remembered those days of service as among the most pleasant in his life. The President then called upon Mr. J. H. Redsecker, who responded in a very happy manner. The next in order was the reception of delegates from the neighboring State pharmaceutical and allied associations, which were well represented. The general tenor of the

remarks of these representatives indicated a fraternal spirit, and a hopeful view of the satisfactory solution of the problems with which the pharmaceutical world was confronted. In behalf of the Association Prof. J. P. Remington, in responding to the greetings of the delegates, said that he felt it an honor to reply to them, and that the occasion was a unique one in that he had never seen so much time devoted to the speeches of delegates. Then on behalf of the College he welcomed the visitors and delegates, and called attention to the portraits of former professors and others, whose silent faces looked down upon them, and who would also welcome them if they were present. The President then gave his address, which we consider of such importance that we reproduce it nearly in full. It is as follows :

I find, in looking over the President's address delivered last year, that he commenced the same with an expression of profound thankfulness to a kind Providence for having spared the lives of so many of our members and permitting them to meet again in annual session. While I feel that I should repeat this expression in behalf of our members, I desire especially to do so for ex-President Remington and myself, for the almost miraculous deliverance from danger to which we were but recently exposed during the frightful railroad accident which occurred on the 12th of May, at Exeter. I venture to say for Professor Remington, and will say for myself, that I feel this deliverance to indicate that our lives were spared for some wise purpose, and as an evidence that there remains some important work yet to be done, and I ask Divine guidance in the performance of whatever duty may be allotted to us.

It has been customary, and is eminently fitting, that at each annual meeting some note be taken of the progress in the pharmaceutical world. Gathered, as we are, for this twenty-second annual meeting of our Association in the rooms of the Philadelphia College of Pharmacy (an institution which, through its instructors, has been instrumental in equipping a larger number of young men to take their places in the pharmaceutical world than any other similar institution in the country), it would be proper that considerable attention should be given in this address to the scientific interests of the pharmacist's calling. I regret that I am not able to do this, but express the hope that those of our members who have gone out into the pharmaceutical world from this time-honored institution may contribute at this meeting, in one way or another, through papers or discussions, to the sum of our pharmaceutical knowledge, and make up what must necessarily be lacking in my contribution to the proceedings.

When you did me the honor to elect me President a year ago, I take it that it was done for the purpose of having an address which would deal more largely than is usual with the business interests of the druggists' calling. As is well known, I have in years past given considerable attention to the trade problems which the retail, as well as the wholesale, druggists of this country have sought to solve, having occupied for ten years the position of Chairman of the Committee of Proprietary Articles of the N. W. D. A. I would, therefore, scarcely be discharging my duty if I did not devote some attention to the present status of the retail druggists' trade interests. When I look over the report submitted at the last meeting, and find that but about 350 of the upwards of 3,200 druggists of this State are members in good standing in this Association, I am reminded that there is the utmost necessity of our bestirring ourselves to find the reason

why this Association (the foremost, I think, in most respects of any of the State associations) should not be able to attract to its ranks more than 10 per cent. of the whole.

It is true that we have had for several years a Committee on Trade Interests. It does not appear to me, however, that the druggists of this State have felt that this Committee has fully met their expectations, or that the Association has made itself sufficiently valuable to them to induce them to become members. While, according to our Constitution, the aim of this Association is "to unite the educated and reputable pharmacists and druggists of the State, to improve the science and art of pharmacy, and to restrict the dispensing and sale of medicines to regularly educated druggists and apothecaries," and this has generally been construed to mean that our deliberations are to be largely scientific, the latter portion of the above quotation from Article II of the Constitution certainly warrants us in assuming that "restricting the sale of medicines to regularly educated druggists" is a part of our work. Believing that the word "medicines" here was not intended to refer only to those dispensed upon physicians' prescriptions, but to apply also to ready packeted remedies known as "patent medicines," I felt warranted, when the call for a meeting of those interested in the formation of a National Association of Retailers to act upon trade matters was promulgated, and I was asked, as President of the Pennsylvania Pharmaceutical Association, to appoint delegates from this Association, to comply with the request. I consulted with our Secretary and the Chairman of the Executive Committee, and as a result appointed the following delegates: Charles L. Hay, of Dubois; J. H. Redsecker, of Lebanon; Wm. McIntyre, of Philadelphia; A. J. Kaercher, of Allegheny.

Messrs. Redsecker and McIntyre were unfortunately unable to attend this meeting, but Messrs. Hay and Kaercher were present and rendered valuable aid in the formation of the National Association. Mr. Hay was made the Chairman of the Committee on Trade-Marks and Patents and Mr. Kaercher, Chairman of the Auditing Committee. Under what favorable auspices this Association was launched at its meeting in October last, and what it has since accomplished, has been so fully brought to your notice through the columns of the pharmaceutical press that it is useless to refer to it here in detail.

I venture, however, to express the opinion that many of the errors made by former similar organizations formed during the last fifteen years were carefully and wisely avoided by this. It was at once seen that if anything of value was to result from the efforts which were to be made by this new and latest organization, it must come as the result of co-operation between the manufacturer, the wholesaler and the retailer. Acting upon this conviction, a brief platform was adopted on which all three classes could unite, and as the three organizations representing these three classes were then in session simultaneously in the city of St. Louis, the endorsement of each was secured before adjournment. The application of the principles laid down in this platform and the work of the Association was committed to an able executive committee and a most efficient Secretary, Mr. Thos. V. Wooten, with headquarters in the city of Chicago. Membership of each State and local association was made up of delegates, each local and State association being entitled to one delegate for each 100 active members or fraction thereof. It was stipulated that "such delegates shall be actively engaged in the retail drug business." It was recog-

nized that the immediate regulation of prices of proprietary medicines was not to be insisted upon, but that local organizations should be encouraged to get together with a view of effecting some change in the margins on such articles, and that as large a proportion of the retail druggists of this country as could be interested should be united under this N. A. R. D. banner, and an amelioration of the trade conditions be effected whenever, wherever and however possible.

The next meeting of this Association is to be held in Cincinnati, on October 3d, 4th, 5th and 6th of this year. We are requested by the Executive Committee, through the Secretary, to officially endorse the purposes of this Association, to provide for a representation through delegates at this next meeting, and to contribute by an assessment of 25 cents upon each of our active members for the purpose of helping the N. A. R. D. put into execution the plans formulated at their last convention, or such as may be agreed upon at the coming convention. I suggest that these requests be referred to our Committee on Trade Interests, and that they be asked to bring before us for our action resolutions placing our Association in line with this request.

Whether the assessments shall be upon the basis outlined in the request is a question which that Committee, owing to the condition of our finances, must carefully consider.

We must acknowledge that that which our Committee on Trade Interests has been unable to do for the druggists we may hope to accomplish more effectually by co-operating with this national body. If, at its next meeting, the deliberation of the National Association be as wise and conservative as the action of its Executive Committee has been hitherto, I am free to say that I have the strongest confidence in their success in many of their undertakings.

One of the questions which has been agitating our neighbors in New York State and City has been the question of shorter hours for drug clerks. As this is a question which may confront the members of our own Association in the near future, I have thought proper to refer to it in this address.

No amendments or alterations to the Pharmacy Law were proposed during the last session of Legislature, though several recommendations were made by the President in his last annual address (who was again made a member of the Committee on Legislation), and though the Association, at the last meeting, endorsed the general Pharmacy Law sent to us for our approval by a Committee of the American Pharmaceutical Association. I would like, however, to reiterate the importance of at least one amendment recommended by my predecessor. Sufficient time has now elapsed since this law has been in effect to show the importance of its being amended, in this one important particular, namely, that after the expiration of a limited time, say two years from the date of its passage, every applicant for a proprietor's certificate should be required, when appearing before the Pharmaceutical Examining Board, to have a diploma from some accredited college of pharmacy. Nothing is clearer than that a sufficient number of young men are willing and able to thoroughly equip themselves for the responsible position of compounding the prescriptions of physicians, through pharmaceutical education, to fully supply the needs of our growing population, to warrant this recommendation.

It was wisely provided, when this law was first passed, that those then in business, whether having a pharmaceutical education or not, should not be dis-

turbed. It was also provided that at that time at least the college of pharmacy diploma requirement should not be incorporated in the bill; but, as already stated, it is admitted by all who opposed such a proviso at that time that now the time has come when this change should be made.

It is urged, I know, by some that, owing to the unprofitableness of the drug business, no further or greater restrictions should be imposed upon those engaged therein, but it should not be forgotten that those who are most successful in this calling to-day are those who are best equipped, through thorough pharmaceutical education, and as the medical examiner's bill fully recognizes this principle, and thus furnishes direct encouragement for the better education of those who are to be admitted to the practice of medicine in this State, so surely should we recognize the importance of encouraging thorough pharmaceutical education in our pharmaceutical colleges.

The Committee on Legislation will doubtless report upon the effort which was made to amend our Poison Law, by the passage of a bill restricting the sale of opium and its preparations, and cocaine, to those presenting physician's prescription, and prohibiting the putting up of such a prescription one week after it had been written. It was urged, by those supporting this legislation, that opium and its preparations were sold and administered freely to minors and others by unscrupulous persons, and that thus great injury was being done, both physically and morally, especially to the young, in some sections of this State.

Those who supported this measure seemed to us to overlook the fact that, while it may be true (and unfortunately I believe is true) that here and there a druggist can be found who so far forgets his moral obligations as to sell freely to any one opium and its preparations, cocaine, etc., to those who are known by the seller to purchase them for immoral purposes, there is equal danger of physicians being found here and there who would be quite as likely to forget their moral obligations and write prescriptions indiscriminately, so that the evil would not be corrected, while great hardship would be inflicted upon the very large proportion of conscientious pharmacists, who would, under this bill, if it had become a law, have been obliged to refrain from selling even a dose of paregoric until the customer had first obtained a physician's prescription. While the bill did not receive favorable consideration at the hands either of the House or the Senate, it emphasized to our Committee the importance of having some well-digested and carefully drawn Poison Law prepared for the next session of the Legislature, and this was promised by them.

The efficient work which was performed by the Chairman of the Committee on Legislation, in the effort of securing a correction of the patent laws under which our friends in Germany now can, and do, compel us to pay tribute to the chemists of that country, without in any way reciprocating the favor, will doubtless be brought before you at this session. I can only say that we have been fortunate in securing for the Chairmanship of this Committee a man who has most intelligently considered the true interests of our members and the druggists generally in this direction, and was accorded the honor of an extended and attentive hearing on November 21, 1898, before the Commissioners on the Revision of our Patent and Trade-mark Laws, appointed by President McKinley.

One of the anomalous conditions to which attention has been called through

the discussions before these Commissioners is that, while the German chemists are able to levy this tax upon us in this country, they have no protection at home, and, what is still worse, considering the matter of our reciprocal relations, a citizen of this country who attempts to market a product in Germany, but who has failed to secure trade-mark registration from the German Government, may be prohibited, in some cases has been prohibited from selling his own product in that country, if someone there has been shrewd enough to anticipate him in securing the registration of a trade-mark upon something under a similar name, in anticipation of the application being made by the owner of the same in this country.

The National Pure Food and Drug Law is still pending in Congress. A second meeting of the Pure Food and Drug Congress was called in the city of Washington, on January 18th last. Our Association was represented by ex-President Redsecker and a number of others of our members, who found, when they reached Washington, that the enterprising Secretary of the Congress had elaborated a programme which certainly had the appearance of being controlled more largely by a desire to keep those who were delegates in the city of Washington for three or four days, than to specially further the interests of this bill. Many addresses were down on the programme, some of them worth listening to, but most of them devoted to rehearsing what the delegates already knew and had previously endorsed, and no material changes were recommended in the bill pending, and no material aid, so far as the delegates from this Association could tell, was given to the work in hand. The coming session of the U. S. Congress will doubtless consider this bill, and it is not improbable that it will secure favorable passage.

We should see to it that no attempts are made to jeopardize the interests of the pharmacists in this proposed legislation, which we believe, as the bill now stands, are fairly well taken care of.

The imposition of the Stamp Tax upon medicines, in which we have special interest, was noted in the last annual address, and its provisions, as outlined therein, went into effect on the first day of July last, and became an additional burden upon the retail druggist, not only to the extent of compelling him to stamp his stock on hand, but of increasing the cost, to an extent even greater than the Revenue Tax imposed, by the makers of many proprietary remedies. It was probably to this cause, more than any other, that we owe the formation of the N. A. R. D., and one of the first and most notable triumphs of that organization was the correction, to a considerable extent, of what seemed an especially unnecessary and uncalled-for imposition of a new burden threatened from some quarters.

The effort to advance margins at retail was, however, hoped to largely reimburse the retail dealer for this change in prices. While in some localities this was successful, it is to be regretted that in many others, notably in the larger cities, it was not. This latter condition, I believe, is largely due to the fact that many makers of proprietary medicines sell direct at largest discounts to those able to buy the quantities for retailing, who usually are the aggressive cutters, and who, by reason of this advantage, are able to sell a single package for the price paid by their less fortunate competitors, the average retail druggists.

Among the wisest steps taken by the N. A. R. D. was the stand they took against this position of manufacturers, and it is gratifying to note that, in a

bulletin recently issued by the Secretary of this Association, it is stated that fully 75 per cent. have recognized the justice of their demand that this be discontinued. Congress, at its last session, did not consider any changes in this internal revenue law. As time goes on, however, it is believed that some amendments which seem to be needed will be made to the law to correct some inequalities, though it is not believed that an abolition of this internal revenue tax will be brought about for many years to come; in fact, it is the general consensus of opinion that internal revenue taxes will be a fixed part of our fiscal policy, the same as it has been for many years in England.

The Executive Committee will refer to the deaths which have occurred in our ranks during the past year. I cannot close this address, however, without referring to the death of one who is so sadly missed at this meeting. While he had reached an age where it was but natural to expect that we could not hope to have his genial presence with us many more years, yet none of us could think of our late fellow-member and first President of this organization, Mr. Chas. A. Heinitch, as an old man.

It will be remembered that in connection with the presentation of the medal which the members of this Association presented to him a year ago, in commemoration of the fiftieth anniversary of his entrance into pharmacy, I related the incident told by Bishop Potter. We little dreamt that this was as prophetic as it was fitting.

We have the consolation, in lamenting his departure, to feel that we *did* make known to him on that occasion, in a way that brought the tears of appreciation to his eyes, our appreciation of his worth, and that we made known to him, in no uncertain terms, our loving regard *before*, not after, his departure hence. It may truly be said that he was a benediction amongst us while he lived, and that his memory will be revered so long as this Association exists.

REPORTS OF OFFICERS AND COMMITTEES.

The Secretary, Dr. Miller, of Harrisburg, said that his report was much the same as during previous years. The Treasurer, Mr. Lemberger, reported a balance of \$269.86. Charles L. Hay, Chairman of the Executive Committee, reported the election of a larger number of new members than usual during the year, and of the participation of the delegates of the Association in the organization of the N. A. R. D., at St. Louis. In his report on Trade Interests, J. H. Knouse considered the present effort to remedy the cut-rate evil on proprietary articles, and said that the Pennsylvania Association are asked to become members of the N. A. R. D. and endorse what they have done in regard to requiring manufacturers to sell at jobbing rates only to legitimate and approved wholesalers. He further said, however, that this will have little or no beneficial effect in re-establishing list prices, unless both manufacturer and jobber are required to absolutely refuse supplies to any one not maintaining full retail prices. The Chairman of the Committee on Legislation, W. L. Cliffe, reported as follows :

"According to instructions received at the last session (see Report for 1889, p. 29), your committee, late in June, 1898, arranged to secure the legal opinion upon the status of the *Phenacetin Cases*, for which an appropriation was made. After a careful study of the question undertaken, for the purpose of keeping the expense within the amount appropriated and presenting a clear and lucid

array of facts for the judicial action of the lawyers, it was decided to call in a chemical expert, and Prof. Samuel P. Sadtler was selected on account of his familiarity with the subject. His report is a clear and comprehensive chronology of the nitro-phenols and their derivations which yield phenacetin and its congeners. His report was then placed in the hands of the law firm of Fraley & Paul, of Philadelphia, who reported upon it to your committee. A copy of both reports in printed form is hereby appended. In view of the fact that the cases involved in this cause are still going through the various legal steps towards a definite judicial decision, it makes *ex parti* comment unnecessary at this juncture.

"Revision of Trade-Mark and Patent Laws.—At a meeting in New York, on November 21, 1898, of the Commission * appointed by President McKinley for the purpose of reviewing the patent and trade-mark laws and reporting to Congress the changes deemed necessary, your Chairman was invited to be present.

"The argument by him was that the present laws admitted the raiding of the pockets of the people of these United States by foreign chemical manufacturers of immense sums, and figures were submitted showing the difference in prices of the same substances of identical sources of manufacture in Canada, Germany and the United States.

"The opposition to these views was represented by Mr. Dickerson, of New York, whose argument clearly showed that he was unfamiliar with the broad principles of equity and justice to the people of this country, upon which the opposition by pharmacists generally to the existing order of things is based. A short quotation from the printed brief shows clearly the spirit which permeates every line of it; it is the sum of his argument: 'The shallows murmur while the deeps are dumb.' 'It is not the strong and responsible houses or associations that are so anxious to have the law changed, but it is, as a rule, the cut-rate man, the man who sells adulterated drugs, the man who cares not for the purity of his chemicals.' The absurdity of this is apparent on its face, as the very man described by Mr. Dickerson is reaping a harvest from the sale of Canadian or German phenacetin at United States prices, and the 'strong and responsible houses and associations' hesitate about committing any act which can be construed as wrong-doing. It is thus pretty clearly indicated why the 'strong and responsible houses and associations' want to see this question settled.

"House Bill No. 153.—On February 16th, of this year, there was introduced into the House of Representatives a bill, the title of which was: 'An act to regulate the sale and use of opium, its derivations and all preparations of which opium or any of its alkaloids is a constituent part; cocaine or any preparation thereof, and to prevent the injurious use of the same.' A similar bill was introduced into the Senate at the same date. The bill was drawn by a lawyer, of York, Pa., for a law and order society in that place. According to their story, a most deplorable condition of affairs existed in that hitherto virtuous town; boys in knickerbockers were rapidly becoming addicted to the hypodermic injection of morphine and cocaine; it was a sort of mania that had become fixed. Your committee, with the aid of the officers of the Association,

* Francis Forbes, A. P. Greely, Judge Peter Grosscup.

first tried to have the bill dropped on account of some preliminary work that had been done on a new poison bill, in which they thought it was probable that the wishes of the friends of House Bill No. 153 could be met. As it was impossible to draw a bill of this class without careful study of every detail, it would not have been possible to have it ready to present at the last session; this proposition did not meet with agreement from the friends of the measure, as they claimed that the conditions existing in York needed prompt legislative treatment. Your committee then submitted the following as an amendment of the original bill. (See this JOURNAL, April, 1899.)

"The matter finally dragged along until the close of the session, and the bill was referred and re-referred, until it was not acted upon through the lack of time. Your committee specially wish to refer to the intelligent aid given by two members of the House, Mr. E. H. Fahey, of Philadelphia, and Mr. Wm. C. Nisbet, of Pittsburg, who are both pharmacists."

Charles L. Hay, Chairman of the delegation to the convention at St. Louis, at which was organized the National Association of Retail Druggists, made a report on the causes leading up to this step and the progress of the new organization.

Immediately following this report, the Committee on Recommendations in the President's Address made its report, which was adopted *seriatim* and as a whole.

The report of the Committee on Adulterations was read by Prof. F. X. Moerk in the absence of Professor Emanuel, Chairman, which dealt principally with individual cases of errors in prescription work. The President, Mahlon N. Kline, said that he was disappointed in the usual reports of the Committee on Adulteration, dealing, as they do, with minor mistakes in prescriptions, whereas a large amount of adulteration is going on in competition with legitimate houses.

In connection with the Committee on Adulterations, Mr. Kebler reported some recent adulterants met by him in the course of his work.

On examining some vanillin recently, he came across a sample that had a melting point of 77° C., and upon further examination it was found to consist of 6 per cent. of vanillin and 94 per cent. of acetyl iso-eugenol, so broken as to resemble vanillin; the direct antecedent of vanillin. More recently there has come to his notice vanillin that consisted of about 90 per cent. of benzoic acid and 10 per cent. of vanillin, and was informed that this article is quite largely used in the manufacture of vanilla extract, a sample of which was shown. Another sample of vanillin sent in was nothing but simple coumarin.

He also has met with a double fluoride of potassium and antimony that could be employed as an adulterant of tartar emetic to advantage, and the present requirements of the Pharmacopœia would not indicate it at all, not even in estimating the amount of antimony present, because the double salt of potassium antimony fluoride could be so made that the percentage of antimony would be identical with that contained in tartar emetic.

He also reported that ferrous oxalate would form a dangerous substitute as an adulterant of bismuth subgallate, from the fact that it has a color identical with that of the article just mentioned.

The Committee on Chemistry recommended that the Association take action on the nomenclature to be adopted by the next U. S. Pharmacopœia, especially in connection with the halogen alkaloidal salts.

PAPERS AND QUERIES.

The presentation of reports was interspersed with the reading of papers, which served to maintain the interest throughout the business sessions. They were as follows :

WOOD TAR CREOSOTE.

BY LYMAN F. KEBLER.

The author gave a communication which was of considerable interest, and said that formerly the popular opinion appeared to be that creosote was simply a mixture of guaiacol and creosol, of which the former predominates in some cases, and the latter in others, but the demand for the salts of guaiacol recently have made such inroads upon guaiacol, that in place of finding creosote containing as high as 60 per cent. of guaiacol to-day, it is very difficult to find an article containing as much as 20 per cent. of guaiacol.

According to his results it would appear that the commercial creosote was almost entirely devoid of guaiacol. The per cent. varied from none to sixteen. According to his experiments the author is of the opinion that creosote has never contained as much as 60 per cent. of guaiacol. This is evidenced by not only his work, but also by the work of A. Béhal and E. Choay, who found that the fraction obtained by distilling crude wood tar creosote between 200 and 210° C. contained at the most only about 25 per cent. He also suggested that the requirements in the boiling of the Pharmacopœia be extended so that they would range between 200° and 220° C., instead of the present range of boiling point, since it is evident that guaiacol comes over boiling 205° C. There were also quite a number of methods given for distinguishing between the genuine creosote and the spurious articles.

THE ASSAY OF BELLADONNA LEAVES.

BY FRANK X. MOERK.

This paper is printed in full (see page 320, of this JOURNAL). In the discussion which followed, Mr. Kebler said that he heard the paper with considerable interest, but that he did not entirely agree with the author, and that he considered the method of percolation, as described by the author, as too cumbersome and too lengthy for practical application with a large number of assays. Professor Moerk called attention to the fact that by his method uniformly higher results were obtained, and that the discrepancies of Keller's method were overcome by the time required in this process.

ODOR AS AN AID IN THE RECOGNITION OF DRUGS.

BY CLEMENT B. LOWE.

The author has endeavored to work out a classification of drugs based on their odors, though on account of the personal element involved no two investigators will probably agree to all of the conclusions reached. The bulk of the paper was taken up with a proposed classification of drugs according to their characteristic odor.

William C. Alpers, of New York, thought that the scientific method of classifying odors of drugs would be to trace them to the chemical compounds which produce these odors. He said that in the Pharmacopœia the term "characteristic" is frequently used, which indicates that we do not know what the odor is.

He also spoke of the term aromatic as being applied to a large number of organic compounds, and that, therefore, the term did not mean much.

ARTIFICIAL FOODS.

BY J. PERCY REMINGTON.

This paper will appear in a later issue of this JOURNAL. Mr. Kebler, in commenting upon this paper, said that he carried out experiments which showed that infants four months old are capable of digesting starch. Among others taking part in the discussion of this paper were Professor Lowe, Messrs. Lemberger and Stedem.

ESTIMATION OF CODEINE.

BY HENRY C. C. MAISCH.

The author takes 0.300 gramme of codeine and places it in an Erlenmeyer flask with about 20 c.c. of water. To the flask is attached, by means of a closely-fitting soft rubber stopper, a delivery tube, of the following construction: The portion connected with the flask has an internal diameter of about $\frac{3}{16}$ inch. About 4 inches above the stopper the tube is bent at right angles, and 6 inches from this it is bent again, so as to bring this portion parallel with the first. This limb is about 4 inches long, and is fused to a tube having a $\frac{1}{2}$ -inch bore, and is about 18 inches long. The lower end of this is drawn out to a bore of about $\frac{1}{8}$ inch, and is then bent upward. This tube is used without a condenser. The end of the delivery tube dips into 20 c.c. decinormal hydrochloric acid diluted with sufficient water, so that the orifice is about $\frac{1}{4}$ inch below the surface of the liquid. After the apparatus is set up, add 10 c.c. of a 10 per cent. solution of ammonium chloride to the flask containing the codeine, and this is at once attached to the tube. The flask is now heated and the liquid kept in a state of ebullition until about one-half has distilled over. The acid liquid is allowed to cool. The delivery tube is then washed out with water and the washings added to the acid solution. This is now titrated with decinormal KOH solution, using coralline or rosolic acid as an indicator; 316.31 grammes of codeine ($C_{18}H_{21}NO_3 + H_2O$) or 298.35 grammes anhydrous codeine are equivalent to 36.37 grammes of absolute hydrochloric acid. From this we have 1 c.c. of decinormal HCl representing 0.031631 gramme of hydrated codeine or 0.029835 gramme of anhydrous codeine.

Among those who discussed this paper were Mr. Kebler and Professor Moerk.

SOME NOTES ON CHONDRUS.

BY HENRY KRAEMER.

The author considered some of the morphological characters of this plant, and referred particularly to its remarkable mode of reproduction, which appears to be that of a triple conjugation. He also considered the collection of the drug on the Massachusetts coast, and advanced some reasons for modifying the definition of the U.S.P.

TINCTURE OF FAT-FREE DIGITALIS.

BY JOSEPH W. ENGLAND.

This paper appears on page 332 of this JOURNAL. Those remarking upon this paper were Professor Lowe and Mr. Eppstein.

LABORATORY NOTES.

BY CHARLES H. LA WALL AND ROBERT C. PURSEL.

This paper contains the records of some of the various drug products examined by the authors during the year, and shows, in a measure, the quality of the goods upon the market. Mr. Procter thought the information presented by Messrs. La Wall and Purse! was very valuable.

BISMUTH SUBGALLATE.

BY LYMAN F. KEBLER.

This paper is printed in full in this JOURNAL (see page 326).

HOW FAR CAN COLUMBIAN SPIRITS REPLACE ALCOHOL IN MANUFACTURING BY PHARMACISTS?

BY D. J. THOMAS.

The author considers the use of Columbian spirit limited in pharmacy, and thought that it might be employed in making tincture iodine, tincture arnica and soap liniment. It is a ready and rapid solvent for corrosive sublimate, and may therefore be substituted in the preparation of "bed-bug poison." It may be used in preparing embalming fluids, burning in spirit lamps, under chafing-dishes, also in the manufacture of the most delicate aniline colors, dissolving shellac, gums and resins for varnishes, for cleaning plate-glass, jewelry and metals. Columbian spirit is used in the manufacture of oil of wintergreen synthetically. It is also employed in the preparation of bay rum, Florida water and various other toilet waters.

In discussing this paper, Dr. J. T. Rodman, of Hawley, said that it would not do in some sections to use wood alcohol to prepare tincture of arnica, because some Germans were in the habit of taking the tincture internally. Prof. F. G. Ryan said that he had come across a full line of fluid extracts for internal use made with Columbian spirits, or wood alcohol. Professor Remington said that one phase of the subject not touched upon was that the Pharmacopœia did not recognize the spirit named, or wood alcohol, and druggists that used it were liable to get into trouble, as the law in some States recognizes the Pharmacopœia as an authority. He also referred to the difference in solvent action of methyl and ethyl alcohol, and advised pharmacists to go slowly in using wood alcohol for making pharmacopœial preparations.

Among others taking part in the discussion were Messrs. Eppstein, Boring and Kebler.

IS THE DEMAND FOR TABLET TRITURATES ON THE DECLINE?

BY D. J. THOMAS.

In 1894 a single operative manufactured 25,000 tablet triturates daily. With improved apparatus, the daily output per operative is, on an average, 100,000, or an increase of four times as many. In 1894 the compressing machines then in general vogue yielded a daily output of about 35,000 tablets; with new rotating machines many times that number can be manufactured by each machine per day. After years of observation, the writer is of the opinion that tablets have come to stay, and advises the pharmacist making his store a physician's supply depot.

THE AMUSING SIDE OF PHARMACY.

BY J. H. REDSECKER.

In this paper the author referred to some of the queer and ludicrous orders that he had received during his long business career. One of these, over which he had puzzled a long time before he solved it, was for "I. E. Die," which was construed finally to mean tincture of iodine. The President then called upon Dr. William Harris, of Hamburg, Pa., who also contributed very much to the amusement of the occasion.

SOME PARTIALLY UNEXPLORED FIELDS FOR OCCUPATION OF THE IDLE HOURS OF THE PHARMACIST.

BY F. W. E. STEDEM.

The author urged the pharmacist to confine himself to that work for which, by education and precept, he is best suited.

THE MODERN PHARMACIST.

BY JOHN F. PATTON.

The author gave some reflections anent the commercial side of pharmacy. Among other things, he said that he believed that pharmacy affords as fair a field with as much promise of success for man's endeavor as any other occupation. To an inquiring mind it is a vista of unlimited extent. From the commercial side no one can complain of the lack of variety of nature products with which it deals. The druggist must be a good business man as well as a skillful pharmacist. The author believes in advertising in the daily newspaper; that success or failure depends alone upon the individual, and that nothing is so conducive to making a man successful as conferences with his fellows, such as are to be had at the annual pharmaceutical association meetings.

THE MEDICAL DRUGGIST.

BY LOUIS EMANUEL, PH.G.

The writer claims that there seems to be no justification for doctors to handle drugs and such medicines which properly belong to the drug store in direct competition to legally qualified druggists.

MISCELLANEOUS BUSINESS.

A special committee having been appointed by the President to frame resolutions on the death of Charles A. Heinitsh and Prof. Henry Trimble, the following resolutions were read by the Chairman, Professor Remington, and adopted:

MR. CHARLES A. HEINITSH.

WHEREAS, Through an all-wise Providence, the Pennsylvania Pharmaceutical Association has suffered inexpressible loss through the death of our first President and staunch friend, Mr. Charles A. Heinitsh, of Lancaster, Pa., who has been taken to his eternal home in the fullness of years and after a life of long and useful service; be it therefore

Resolved, That in the loss of one who has endeared himself to every member by his rare qualities, his nobility of character and his sterling virtues, we bow in submission to His will, and we have had an example set before us that it should be our greatest aim to emulate.

Resolved, That this Association place upon its records this tribute to the memory of one whose kindly heart and loving spirit, though absent from our

counsels, can never be forgotten by any of his associates who have enjoyed his companionship and friendly advice.

Resolved, That this Association convey to his deeply attached wife and companion for many years, our sincere sympathy in her affliction and our assurance, as we mingle our tears with those of his many friends, that we are comforted by the belief that he is enjoying the full fruition of the hope and faith that he so frequently expressed of a blessed Immortality.

PROFESSOR HENRY TRIMBLE.

WHEREAS, The Pennsylvania Pharmaceutical Association, during the past year, has lost, by the death of Prof. Henry Trimble, one of its most earnest and valuable members; and be it

Resolved, That we hereby record upon our minutes our high appreciation of his labors in our behalf; his willingness to serve this body in any capacity, but particularly in the special field of his activity, chemical science, is gratefully recognized.

Resolved, That this Association convey to his widow our heartfelt sympathy in her bereavement, and that a copy of these resolutions be sent to her.

J. H. Redsecker, as Chairman of the Nominating Committee, presented the following report, which was unanimously adopted: President, Charles Newton Boyd, Butler; First Vice-President, Charles Lamar Hay, DuBois; Second Vice-President, Dr. Charles A. Weidemann, Philadelphia; Treasurer, Joseph Lyon Lemberger, Lebanon; Secretary, Dr. Jacob Augustus Miller, Harrisburg; Executive Committee, Daniel Judson Thomas, Scranton; Sigmund W. Heinitsh, Lancaster; Cyrus Jacoby, Bethlehem; Local Secretary, Charles H. Marcy, of Altoona.

John F. Patton, the Chairman of the Committee on Time and Place of Next Meeting, reported that the Committee had unanimously agreed upon "Maple Park Springs, Ebensburg, Cambria County," as the place, and June 19, 1900, as the time for the next annual meeting.

SOCIAL FEATURES.

The social features of the meeting were unusually attractive and enjoyable. The President's reception was held on Monday evening, June 12, in the Philadelphia College of Pharmacy. The visiting members and delegates were thereby afforded an excellent opportunity of becoming acquainted and meeting each other before the regular business sessions. On Tuesday evening there was an excursion to Willow Grove Park, when refreshments were served at the Casino, and an excellent musical programme rendered by the celebrated Banda Rossa. On Wednesday evening there was a reception and dance given by Philadelphians to the visitors, in the Assembly Room of the Union League. The remaining days, Thursday and Friday, were spent in pleasurable pursuits at Atlantic City.

PROFESSOR JOSEPH P. REMINGTON has recently had conferred upon him, by Northwestern University, *honoris causa*, the degree of Doctor of Pharmacy.

FRANK X. MOERK, heretofore Instructor in Chemistry, has been elected to the chair of Analytical Chemistry in the Philadelphia College of Pharmacy, made vacant by the death of Professor Henry Trimble.

THE AMERICAN JOURNAL OF PHARMACY

AUGUST, 1899.

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NEWER OBSERVATIONS CONCERNING THE DETECTION OF BLOOD BY MEANS OF THE GUAIAECUM REACTION.

BY EDW. SCHAEER, Strassburg.

In a longer paper,¹ "On the Use of Guaiacum Resin as a Reagent," I have been trying, among other points, to recapitulate, as briefly as possible, the propositions of the last thirty years concerning the detection of blood with guaiacum resin, and with the so-called "Antozonides," viz., with peroxide of hydrogen or the analogous compound contained in isolated essential oils and acting like hydric peroxide. In this question the following memoirs are to be mentioned:

(1) *I. von Deen*, "Tinctura Guajaci u. ein Ozontiaeger als Reagens auf sehr kleine Blutmengen" (*Archiv. f. d. holl. Beitr. z. Naturw. u. Heilkunde.*, Utrecht, 1861-64, III, 228 to 231).

(2) *C. F. Schönbein*, "Ueber das Verhalten des Blutes zum Sauerstoff" (*Erdmann's Jour. f. pract. Chem.*, 89, 22, "Sitzgsber. d. Münchener Akad., math. phys. Classe," 1863, II, 274).

(3) *F. L. Hünefeld*, "Die Blutproben vor Gericht, etc.," Leipzig, 1875.

(4) *H. Fahrner*, "Ueber den Nachweis von Blut mittelst der Guajak-Probe," Würzburg, 1876, Inaug. Diss.

(5) Lastly, a short paper of *D. Vitali*, which, however, I was not enabled to see in the original.

¹ *Forschungsberichte über Nahrungsmittel, Hygiene, Pharmakognosie u. forens. Chemie.* Herausg. von A. Hilger, München, 1896, Heft 1.

The importance of a trustworthy means of identifying blood or blood constituents like hemoglobin, methemoglobin and hematin in numerous judicial cases and the value of a combination, on many rather difficult occasions, of the spectroscopic test and of the methods of preparing the characteristic crystals of hemin (as described by *Teichmann*, *Hoppe-Seyler*, *Brücke* and *Preyer*), with the "ozone-transferring" action of the coloring matter of blood towards guaiacum, has induced me, for many years, to pay special attention to the last-named blood-test and to look for improvements of the hitherto known methods, which in some respects were far from being thoroughly satisfactory. As it happens in many cases, some accidental observations have led to the right way nearly as well as systematic experiments.

Many years ago (in 1866), after having attended the lectures of *C. F. Schönbein* (the chemist of Bäle, well known in England by his acquaintance with Faraday and other celebrated naturalists) and seen his experiments concerning the action of blood-cells on hydric peroxide and solution of guaiacum resin, I had gathered a series of experiences, which formed the chief content of a lecture held at Zürich (in 1875), but never published in print. The method then demonstrated having proved useful in a practice of almost thirty years, I could not hesitate to mention it in the above-named paper, "On the Use of Guaiacum Resin as a Reagent." The details of this method can be noted very briefly in this place, the more so as they may be found in the above-mentioned essay, and as the method has been communicated and discussed by *R. Otto*, in the supplementary part of his "Anleitung zur Ermittlung von Giften," etc., VII, Ed. (1897).

While the authors above referred to mainly recommended to mix the blood solutions—(obtained by extraction of a fresh or old blood-stain with small quantities of water, either alkaline or acidulated with acetic acid)—under suitable conditions first with an alcoholic guaiacum solution and then with transferable oxygen in the form of hydric peroxide or of the analogous compound contained in old and isolated turpentine oil (for instance, the liquid of Hünefeld, v. i.), and to observe the formation of the so-called "guaiacum blue," the method which I have proposed aims at the preparation of an intimate and durable mixture of the coloring matter of blood derived from the blood stain with guaiacum resin. This mixture

may be conserved for an indefinite time as a "corpus delicti," and at every moment strikes a very intense blue color by contact with one or another of the liquids containing loosely combined oxygen, provided that errors are cautiously avoided by check experiments. The proceeding, wanting but a short explanation in reference to the more explicit description in the paper quoted, chiefly consists in mixing the blood solution, obtained by extraction of blood stains, with an alcoholic solution of guaiacum resin² (or, as it has been lately proposed by *O. Döbner*, with a similar but weaker solution of guaiaconic acid), in which case a milky secretion results of the previously dissolved resin constituents, which, in these conditions, partly attract, fix and precipitate at the same time the dissolved or suspended coloring matter of blood (either in the state of hemoglobin and methemoglobin or of hematin). In this way a mechanical combination of the secreted resin with the said blood constituents is formed, which process reminds us in some way of the well-known method by which some ferments, like pepsin, are secreted by means of an indifferent precipitate caused in the ferment solution and afterwards extracted. If, then, we separate the precipitated resin (or the above-mentioned constituent acting as reagent) by thoroughly dense filters (especially the newer "hardened filters" of commerce), the hematin compounds are fixed on the surface of the filter in extreme division together with the particles of resin. These filters, when well protected from light and air even during the filtration process and then cautiously dried in the exsiccator, may then be conserved for any length of time. But a small piece of them is wanted, to cause in a few moments an intense blue coloration in a porcelain dish or watch glass on white paper, after it has been moistened with a little spirit of wine, and then a small quantity of Hünefeld's liquid (mixture of so-called "ozonized" turpentine oil with alcohol, chloroform and a little acetic acid) has been added. This process is equally applicable to blood stains, and to the detection of blood in urine, and other similar objects, and may be used as well for the research of relatively fresh blood, as for that of old dry stains, owing to the fact already

² It is preferable, in this case, to use a solution of about 5 per cent. of resin (instead of the alcoholic guaiacum tincture (1 to 2 per cent.) mentioned by *Schönbein* as the common reagent), in order to secure an easy secretion of resin in presence of small portions of blood.

observed by *Schönbein*, viz., that the coloring matter of blood altered by exsiccation even in higher temperatures still shows in unimpaired degree the different "ozone-transferring" properties, and even seems to act more intensely in some respects, for instance, towards a mixture of peroxide of hydrogen and cyanine.

Since the publication (in the quoted treatise) of this modification in the methods of detection of blood by means of guaiacum, some observations on different points of solubility of the red-colored blood constituents, especially in dry blood, have taken place, which lead to new propositions concerning a reliable, very short and direct way for the detection of blood, and therefore may be communicated in this JOURNAL, after having been briefly related in the pharmaceutical section of the annual meeting of German naturalists at Brunswick in 1897. By occasion of former studies and experiments on the physical and chemical behavior of chloral hydrate, which later on have been continued and extended by a pupil and assistant, *R. Mauch*, pharmaceutical chemist,³ a special solvent power of highly concentrated, that is to say, 65 to 80 per cent., aqueous solutions of the said compound has been observed, not only for several bodies already known, like starch, but also for various very different substances, like certain resins, coloring matters, stearoptenes and also albuminous matters, especially the coloring matter of blood. In fact, experience showed that blood stains which have become dry even for a long time on linen or other similar materials are extracted in a relatively short time by impregnation and contact with a chloral hydrate solution of about 70 per cent. and more thoroughly dissolved than by any other treatment. Even blood stains many years old may, by this operation—after a somewhat longer contact with the solution—be removed to such a degree that their trace is but hardly discernible on the linen. It may be observed on this occasion that the solution of the blood constituents by aqueous chloral hydrate is much facilitated if the blood spots have been previously wetted with small quantities of concentrated acetic acid. The use of this acid is not only admissible for itself, as the guaiacum-blue is not affected by it, but even offers a certain advantage concerning a reaction of control to be mentioned later on.

³C. f. "Ueber physikal.-chem. Eigenschaften des Chloralhydrates u. deren Verwerthung in pharm.-chem. Richtung." Inaug. Dissertat., Strassburg, 1898. In this paper a short chapter is also dedicated to the present question.

Inasmuch as guaiacum resin, as well as the guaiaconic acid, specially concerned in the formation of "guaiacum blue," are both easily soluble in the concentrated chloral hydrate solution, a simple method may be devised for the extraction of blood stains and the subsequent detection of the coloring matter of blood. This modification of the former procedures having led to identical results in all the numerous experiments executed for this purpose, I have no reason to wait any longer for the communication of a process which may sometimes prove a desirable supplement to the other methods for the detection of blood.

In fact, the guaiacum blood test can be prepared and managed on the simplest terms in this way, that first the colored spots in question, after moistening with a little acetic acid, are extracted either with a 70 per cent. chloral hydrate solution or directly with a 1 per cent. solution of guaiacum in aqueous chloral hydrate, containing 70 to 75 per cent. of the latter. In regard to the fact that the resin constituents concerned in the subsequent reaction show a marked tendency for spontaneous oxidation—as is sufficiently proved by the well-known change of color in the air and light—this latter method, on the whole, seems less preferable than the first named, which consists in *first extracting the blood* by means of chloral solution and then *adding to the resulting blood solution* about an equal volume of the guaiacum chloral solution. If in this process the blood stain has been moistened with acetic acid previous to the treatment with chloral hydrate, the addition of guaiacum chloral solution to the chloralic extract of the stain to be tested for blood will permit a control reaction, inasmuch as the casual presence of nitrites (as, for instance, nitrite of ammonia) in the respective stain would at once cause a more or less intense blue coloration of the mixture owing to the decomposition of these salts by the acetic acid, the nitrous acid coloring guaiacum, viz., guaiaconic acid blue even in high dilutions. Moreover, if the chloral extract of the stain contains only blood, the addition of the brownish-yellow guaiacum chloral solution to the pale red liquid derived from the stain will give a pale brown mixture exceedingly well adapted for a decisive zone reaction indicating the presence of hematin. To this blood guaiacum solution in aqueous chloral hydrate a stratum of the already mentioned turpentine solution of *Hünefeld* or of an adequate solution of hydric peroxide (*the indifference of which*

towards *guaiacum tincture* being previously stated) is carefully added without mixing; then an intensely blue and rapidly increasing zone appears, with extraordinary sensibility, in the place of contact and diffusion of the two solutions, while by sudden mixture a less pure blue coloration of the liquid results.

By the way, it may be mentioned that, after my experience confirmed by other observers, the method may also, in suitable cases, be so modified that the blood solution is first mixed with *Hünefeld's* liquid and then added to the *guaiacum* solution. This process can just as well be conducted to obtain a zone reaction or also a capillary reaction.

In cases of extraordinary small blood stains, so as to necessitate, in a certain measure, a microchemical operation, or where the respective residue of blood has to be tested on its natural place, it is advisable to digest the stain on a flat porcelain dish with strong chloral solution (v. s.), having first moistened with a small drop of acetic acid, and, after half an hour's contact, to pour on the digested spot first a corresponding small quantity of *guaiacum* chloral solution, and then, after having thoroughly mixed, a few drops of the one or other liquid containing the peroxide. With this method also a more or less intense blue coloration is seen to appear on the light-colored underground. Experience has shown me that even *very old* blood stains and exceedingly small parts of such may be identified in this manner, provided a sensible *guaiacum* chloral solution, prepared with quite fresh resin, and at the same time a liquid of *Hünefeld* or hydric peroxide solution of right composition⁴ and controlled in regard to their activity are used. The zone reaction surpasses the other older methods of testing by special purity of the blue color resulting from the formation of the so-called "*guaiacum blue*;" besides that this purer color is more durable, according to the fact that in the measure of progressive mixtion of the active substances of the two layers (hematin as the oxygen-transferring body, hydric peroxide or essential oil as the source of oxygen

⁴ A solution of *Hünefeld* suitable for the purpose may easily be prepared, mixing f. i. 15 c.c. of turpentine oil, exposed to light and air for a certain time (*but which ought not to change directly blue in the guaiacum tincture*), or 15 c.c. of a 3 to 5 per cent. hydric peroxide solution, free from acids, with 25 c.c. of alcohol, 5 c.c. of chloroform and 1.5 c.c. of glacial acetic acid.

and guaiaconic acid as the oxidable compound) small quantities of the intensely blue colored oxidation product are formed gradually. It is true, however, that the "guaiacum blue," especially in the presence of organic reducing agents, is not very stable, inasmuch as this compound, to use an expression of its first investigator, *C. F. Schönbein*, contains loosely combined, movable and active oxygen in the ozonide state.

The foregoing shows, as it seems, the usefulness of the modified guaiacum blood-test when cautiously applied; on the other hand, it cannot be denied that the reaction is liable to certain misinterpretations, in cases where some other organic or inorganic substances are present, instead of blood. It is scarcely necessary to mention in this place the numerous compounds which, as, for instance, nitrous acid, free chlorine, bromine and iodine, chromic anhydride, permanganic acid, peroxide of lead, the ferric and cupric salts, quinone, etc., *directly* color blue the guaiacum resin; because, first of all, many of these bodies are exempted *a priori* in the majority of materials submitted to the blood-tests, and secondly, because in their presence the liquid extract of a stain to be tested for blood would *at once* strike a blue color when mixed with a little guaiacum tincture *before the addition of Hünefeld's peroxide-solution*. In regard to these facts, the somewhat superficial notice of some text-books, viz., that the guaiacum blood-test is not reliable, "because many substances change guaiacum for themselves," cannot be taken as a warning against the use of the said method, since, certainly, no careful analyst will ever neglect to avoid mistakes by availing himself of the control-reactions indicated in each case! Yet, such substances of inorganic or organic origin, as share the "ozone-transferring" quality with the contents of the blood cells, viz., the coloring matter of blood, might in some single cases lead to a false interpretation of the guaiacum-blue-reaction. Among organic vegetable substances, bodies of the class of ferments may be named, as well as hydrolytic ferments (enzymes in the stricter sense of the word) chiefly so-called oxidizing ferments, as they occur in numerous parts of plants, especially in mushrooms and plant seeds, while among animal substances in the first line saliva, extracts of some organs, the contents of white blood cells and pus cells, etc., show analogous properties. These albuminous substances of the character of ferments, existing in vegetable and animal cells, and exerting in a more or less mani-

fest degree a catalytic and, at the same time, "oxygen-transferring" action towards hydric peroxide, strictly differ from the coloring matter of blood in that the last-named action is cancelled, or at least most strikingly weakened by heating to 100° C., or also by contact with diluted hydrocyanic acid! In case the extract of a pretended blood stain contains such a substance of the class of ferments, instead of the ingredients of blood, it will cease to show the guaiacum-reaction, even after a shorter digestion at the temperature of the water-bath, and also a control-experiment *with addition of hydrocyanic acid during the extraction* of the stain will give essentially negative results.⁵ However, the avoiding of every mistake becomes rather difficult in such cases, where the presence of even the smallest quantities of ferrous oxide or other ferrous compounds can occur, as, for instance, in the testing of suspected stains on rusty iron materials. If the rust, even in the absence of blood, contains small portions of certain ferrous compounds, viz., ferrous carbonate or other ferrous salts, they could, by extraction, be introduced into the filtered solution, even in case the latter had not taken up any ferric hydrate or basic ferric salt; yet such an extract of a stain, even with the slightest trace of ferrous oxide, would cause the guaiacum-blue-reaction after subsequent addition of guaiacum resin and hydric peroxide. A strict distinction of ferrous oxide and of the coloring matter of blood is not very easy in such cases, because the first-named compound, even in smallest quantities, manifests the same intense "ozone-transferring" power as hemoglobin or hematin, which also contain iron. It will, therefore, form the object of further experiments to find out how the mentioned casual mistaking in the guaiacum-blood-reaction may be eliminated. On occasion of such further researches concerning the reaction discussed in this paper, the question would have to be treated, whether blood, which, after drying up in slow decomposition on certain materials, like stone, clay and rough metallic surfaces, and after disappearance of the organic substance by the action of air and water, leaves but rusty spots, can generate in these conditions seizable quantities of ferrous compounds.

The above-described method of extraction of blood stains with

⁵ For further particulars concerning this question see Ed. Schaer's "Contributions to the Chemistry of the Blood and the Ferments," *Zeitschr. f. Biologie*, Vol. VI (1870), p. 467.

concentrated solutions of chloral hydrate which, as is well known by this time, are also good solvents for resins, has induced some experiments in order to ascertain whether, by using the process mentioned in the first part of this essay, chloral solutions containing blood and guaiacum may, by precipitation with water and subsequent filtration, give a resinous secretion containing blood constituents, showing the mentioned behavior and applicable to the guaiacum-blood-reaction after any time of conservation. It may here be stated, by the way, that the trials performed in this manner have but led to a moderately satisfactory result, probably because even a diluted chloral-solution still acts as a solvent on the resin in a low, but perceivable degree and besides, as I am induced to believe, because the coloring matter of blood is less easily precipitated by the secreting resin from a chloral-blood-solution than from a chiefly aqueous liquid. But, notwithstanding the loss of material caused in that way, by the use of this method resin-covered filters can be obtained possessing the properties quoted in the beginning of this paper.

Lastly, it may be mentioned that—as it could be expected—the guaiacum blood-test executed with chloral solution is thoroughly applicable to a control-reaction, viz., to the chemical identification of the hemin-crystals, which are of high importance in judicial cases. A specially pure blue coloration is obtained, when, instead of the ordinary guaiacum-solution, a solution of guaiaconic acid in 200 to 500 parts of chloral-solution (v. s.) is used, and the reaction is observed in a glass tube as a zone-reaction. The guaiaconic acid, proposed as a substitute for the natural resin by *O. Doebner*⁶ in his interesting essay on guaiacum resin and “guaiacum-blue,” is just as well liable to spontaneous oxidation in light and air with changes of color; and, according to my observations, its use is more convenient for the described zone-reactions than for experiments in watch glasses or dishes, where greater surfaces get into action. It is, moreover, obvious that this special experience cannot interfere with the certainly desirable use of the guaiaconic acid, as being the active constituent of the resin, in the numerous other guaiacum-reactions. I cannot but feel convinced that the reactions with guaiacum resin have not, in all respects, met with the consideration

⁶ See *Archiv. d. Pharmacie*, 1897.

they deserve, neither in general nor in medical and pharmaceutical chemistry, so I thought it advisable to publish this little contribution to the question in this convenient place.

STRASSBURG (GERMANY) PHARM. INSTITUTE UNIVERSITY,
March, 1899.

THE OIL AND TERPENES OF ARALIA NUDICAULIS.¹

BY WILLIAM C. ALPERS, SC.D.

The specimens of *Aralia Nudicaulis* subjected to chemical analysis were gathered by the writer in the hilly woods of Bergen County, N. J., near the banks of the Passaic River. When freshly collected, the rhizome contains from 40 to 60 per cent. of moisture, according to the age of the plant and the time of collection. After drying in the air and afterwards at a temperature of about 100°, the drug was finely powdered, and all the following calculations are based on this dried sample. The quantity of ash obtained on incineration varied in younger and older specimens from 5 to 6 per cent., giving an average of 5.53 per cent. Nearly one-fourth of this, or 1.38 per cent. of the original dry sample, consisted of soluble chlorides and sulphates of sodium and potassium.

A number of preliminary examinations, made by extracting the organic matter with various solvents, had shown that the solvent, generally employed first, after Parson's method, namely, chloroform, would dissolve all the oils and resins contained in the plant; but great difficulties were encountered in separating the fixed oil and some of the resins. It is owing to this fact that, in a paper by Alpers and Murray (see "Proceedings American Pharmaceutical Association," 1897), the fixed oil was overlooked and classified as resin. As these preliminary examinations further showed that petroleum-benzin would dissolve the oils, but hardly any of the resins of the plant, it was deemed advisable to use this solvent first, and employ in general the method recommended by Dragendorff in his "Plant Analysis." Therefore, 250 c.c. of the drug were digested with petroleum-benzin in a narrow cylindrical percolator, covered with the solvent and allowed to macerate for eight days. The petroleum-benzin used for this purpose had previously been

¹ Extract from the thesis for the doctorate at the New York University.

treated with sulphuric acid, and was distilled at a temperature below 75° . After maceration, percolation with the same solvent was continued, until the percolate failed to show any reaction with the commonly employed reagents for oils, resins, alkaloids, etc. The percolate was then evaporated at a temperature below 75° , leaving a dark-red, thick liquid. The remaining drug, after the extraction with petroleum-benzin, was thoroughly dried and macerated with anhydrous ether, that had previously been distilled over sodium. After eight days the ether was drawn off and the drug washed three times with the same solvent. After distilling off the larger part of the ether, the remainder was allowed to evaporate spontaneously, leaving behind a resinous mass weighing 2.253 grammes. This mass was treated with petroleum-benzin in order to extract whatever might have escaped the first solvent, and a loss of .275 gramme was noted. This value was added to the benzin extract previously determined, leaving 1.978 grammes of ethereal extract; to this must be added that part which was afterwards gained from the alcoholic extract, namely, 1.223 grammes, making a total of 3.201 grammes, or 1.280 per cent. This ethereal extract, which before treatment with petroleum-benzin was rather soft, was now hard and brittle and could easily be pulverized. It was treated at ordinary temperature with cold water, which failed to dissolve any of it. The ethereal extract, after drying again, showed no loss of weight. It was then treated with absolute alcohol, which dissolved the larger part of it, leaving a residue of .107 gramme, or .043 per cent. of the original drug. This residue, soluble in ether, insoluble in petroleum-benzin, absolute alcohol and water, consists of a fine dark powder, of neutral reaction, indifferent to the common reagents, forming no combination with metal-salts, and may be called an indifferent resin or resin-anhydride (Dragendorff, "Plant Analysis"). The part of the ethereal extract, 3.094 grammes, or 1.237 per cent., of the drug, soluble in absolute alcohol, is hard and brittle, of a light-brown shining color, has an acid reaction, and forms compounds with most metals. With ferric salt a dark-green color is produced, turning red on addition of potash solution and then yellow on addition of hydrochloric acid. Ferrous salts give no color reaction. Lead acetate, cupric acetate, silver nitrate and other salts are decomposed by it. A slight precipitate is also formed by a solution of gelatine. It is, therefore, an acid resin, with the admixture, probably, of a small amount of tannic acid.

The residue of the drug, after extraction with petroleum-benzin and ether, was again dried and treated with absolute alcohol in a cylindrical percolator. After maceration for seven days, percolation was continued to exhaustion. A part of the percolate was evaporated at a temperature below 50° , and from the residue the total amount of alcoholic extractive was calculated to be 6.052 grammes. This extract was then treated with petroleum-benzin, which failed to dissolve any of it. It was then treated with ether, suffering a loss of 1.223 grammes, as previously stated. The remainder weighed, therefore, 4.829 grammes, equal to 1.931 per cent. of the original drug. This alcoholic extract gave all the common reactions for tannin. There were, however, also indications of an organic acid, the nature of which was not determined. Besides these, a small amount of an acid resin, similar to the one of the ethereal extract, was present.

The extract of each solvent was examined by a series of tests for alkaloids, without showing traces of any.

The following is a summary of the three extracts:

Extract with	Percentage of dry drug.	Containing
Petroleum-benzin . . .	1.726 per cent. . . .	mostly fixed oil; volatile oil from .04 to .12 per cent.
Anhydrous ether . . .	1.280 per cent. . . .	.043 per cent. indifferent resin; 1.237 acid resin.
Absolute alcohol . . .	1.931 per cent. . . .	mostly tannin; some acid resin and probably an organic acid.

CHEMICAL EXAMINATION OF THE OIL.

The extract, gained by treating the drug with petroleum-benzin, adding to it the parts dissolved from the ethereal extract, weighed in toto 4.316 grammes, equal to 1.726 per cent. of the drug. On exposing it to a heat of 110° a slight loss of weight was experienced owing to the evaporation of the volatile oil. As this latter forms a variable constituent, as will be shown later, no account of the amount evaporated was taken.

THE FIXED OIL.

The fixed oil is perfectly clear, of a dark red color, soluble in petroleum-benzin, benzin, ether and chloroform, sparingly soluble in absolute alcohol, insoluble in alcohol and water. It has a bitter, acrid, pungent, lasting taste, causing a feeling of dryness in the

mouth, and reminding of the peculiar fragrance of the fresh rhizome; its odor resembles castor oil slightly. At ordinary temperature it is rather thick, solidifies at 3° and decomposes at about 300° ; efforts to distil it in vacuo were not successful. Its specific gravity is $\cdot 921$ at 20° . Under the influence of nitrous acid it solidifies, forming a grayish-yellow, sticky, doughy mass of elaidin.

For further identification the acid, saponification, and iodine figures were determined after Benedict, "Die Analyse der Fette," with the following results:

Acid figure	7.39
Saponification figure	192
Iodine figure	106

By boiling the oil with alcoholic potash solution, made by dissolving 57.0 potash in 430 grammes 40 per cent. alcohol, using a reflux condenser, a dark brown soap was prepared; by extraction with ether a small amount of crystallizable alcohol was obtained, which by recrystallization from hot alcohol could be purified. There was, however, too little of it to subject it to further examination. The soap was decomposed with tartaric acid, and the separated oily acid extracted with ether. The remaining aqueous liquid, containing principally potassium tartrate, was carefully evaporated and yielded by means of ether-alcohol a sweetish alcohol, soluble in water. By heating this alcohol with potassium hydrogen sulphate the characteristic odor of acrolein was evolved. A borax bead immersed in this alcohol imparted a green color to a non-luminous flame. This water-soluble alcohol was therefore recognized as glycerin.

The fatty acid gained from the soap readily forms compounds with most metals. Its lead salt was soluble in ether, and from this fact and the elaidin test previously mentioned it was recognized as consisting principally of oleic acid.

An observation of the depression of the freezing point of this fixed oil was made in the following manner:

Benzol was used as a solvent and Beckmann's apparatus employed. The oil being too thick to be introduced into the small side tube, a solution of known percentage in benzol was used instead of the pure oil, and two different observations with solutions of different percentages were made. The first depression of the freezing point was $\cdot 153^{\circ}$, the second $\cdot 323^{\circ}$, from which the calculated molecular weight resulted as 907 and 914, after the formula

$$M = \frac{K \times P}{D},$$

K being the constant for benzol, P the percentage of the oil in the solvent and D the depression of the freezing point. As the same apparatus with the same benzol was used in both experiments, it was to be expected that the figure of the second determination would be a little higher than the one of the first determination, as the evaporation of some benzol could not be prevented, and the solution had therefore a higher than the calculated percentage. From the elaidin test, previously mentioned, the presence of olein was indicated, and from this fact and the calculated molecular weight (907 +) it appears probable that the larger part of this oil consists of triolein, $C_3H_5(C_{18}H_{33}O_2)_3$ (molecular weight, 884).

As the summary of the investigations of the fixed oil of *aralia nudicaulis*, the following is presented:

Dark red color; specific gravity, .921 at 20°; soluble in petroleum-benzin, benzin, ether, chloroform, sparingly soluble in absolute alcohol, insoluble in alcohol and water; acrid, pungent taste, slightly resembling castor oil in flavor. At ordinary temperature thick, not drying, solidifying at 3°, forming elaidin with nitrous acid; acid figure, 7.39; saponification figure, 192; iodine figure, 106; molecular weight, about 900; constitution, largely triolein, $C_3H_5(C_{18}H_{33}O_2)_3$.

THE VOLATILE OIL.

Together with the fixed oil, the petroleum-benzin dissolved a small quantity of a volatile oil, the presence of which in the plant had already been established by the microscopical examination of the bark of the rhizome. In order to obtain a larger amount of this oil, 50 kilos of finely powdered *aralia* were distilled with steam. Owing to the absence of convenient apparatus, this work was done at the pharmaceutical laboratories of Lloyd Brothers, Cincinnati, O., through the kindness of Prof. John Uri Lloyd. Two different lots of 50 kilos each were distilled at two different times, the first in the fall of 1897, the second in the fall of 1898. In both cases the drug was expressly gathered by competent root collectors and examined as to its purity by the writer. The process of distillation was described by Professor Lloyd as follows:

“ Fifty kilos of the fresh root were ground coarsely and put in a

tinned copper still connected with a tinned worm. The drug rested on a perforated tinned diaphragm. Steam was conducted beneath the diaphragm and allowed to slowly pass into and through the powder, finally reaching the condenser, from which the condensed water was run into a 100-gallon glazed stone jar. Every part of the apparatus was perfectly clean and kept closely covered during distillation. The distillation continued for four days, the oil being skimmed from the water daily. The operation was finished when 100 gallons of distillate had been obtained, it being then shown that no additional oil appeared. The oil-saturated water was then shaken, a portion at a time, with chloroform, the chloroform being separated from each portion and used to abstract each succeeding portion. The chloroform solution and essential oil were contained in the two bottles sent you, and close investigation of the drug in the still demonstrated that no oil remained with it. The condensed water that trickled from the drug gave no evidence of volatile oil.

"During the period of distillation, a separate portion of the steam used was condensed in order to determine that no oil passed from the boiler. It gave clean condensed water."

The quantity of oil gained at the two distillations varied greatly; in 1897 about 60 c.c., or .12 per cent., were obtained, while the second yield was only about 20 c.c., or .04 per cent. Concerning this difference Professor Lloyd writes:

"I pushed the distillation to the utmost limit, carrying it as far as any yield whatever of oil could be observed, and the difference in the amount I obtained this time and that I obtained before lies in the variation of the quality of the drug. Now, inasmuch as the drug was dug by the same party each time and the same time of year and in the same locality, the variation results from the different quality of the drug, for the manipulation was exactly the same in both instances. I will add that I am not at all surprised at the outcome, for my experience in indigenous drugs is to the effect that such variations are to be expected. They result from local conditions, such as drought, atmospheric influences, etc., and they are to be expected rather than not expected."

After the oil of aralia, as received from Professor Lloyd, had been freed from chloroform by distillation, it was dried over calcium chloride. This oil had a peculiar pleasant aromatic odor, resembling young carrots, and was of a clear light yellow color.

It was then subjected to repeated distillations at reduced pressure of 80 millimetres. By far the larger portion distils at this pressure at a temperature of 185° to 195° ; at normal pressure the boiling point is from 260° to 270° .

After a series of tests for nitrogen, sulphur and halogens, showing the absence of these elements, a number of combustions were made with the following result:

	C. Per Cent.	H. Per Cent.	O. (By subtraction.) Per Cent.
1.	86.24	11.52	2.24
2.	86.28	11.47	2.25
3.	85.95	11.58	2.47

While the proportion of carbon and hydrogen seemed to indicate the presence of a terpene, $(C_{10}H_{16})_n$, it was clear from the calculated oxygen that at the same time a compound containing this element, probably an alcohol, was mixed with it. All efforts to separate these two or more substances by fractional distillation were futile, the boiling point gradually rising from 260° to 270° , when the last particle would pass over, without showing any indication of accumulation at any particular point. It became, therefore, necessary to adopt chemical methods for their separation; this could be done only with the greatest care owing to the small quantity disposable. After several unsuccessful efforts, metallic sodium was added to the oil, causing a lively reaction with generation of hydrogen, the sodium combining with the substance or a part of it. The whole mass became thick and gelatinous, and it was then supposed that polymerization had taken place. At this point the investigation was interrupted for a number of months. After this time it was observed that the gelatinous mass consisted of two parts of different aggregation, and for their separation distillation at a pressure of 80 millimetres was undertaken. At this pressure a perfectly colorless oil of a strongly aromatic odor distilled over at a temperature of 189° , comprising more than two-thirds of the previous quantity. The remaining fraction showed the presence of sodium.

On raising the temperature still higher at ordinary pressure, a few drops of a clear blue oil were obtained, at a temperature of about 300° , probably azulene of the formula $C_{16}H_{26}O$ (boiling point, 302°).

The clear oil was redistilled at ordinary pressure, and a steady boiling point of 270° observed. Elementary analyses resulted as follows:

	FOUND.		Calculated for (C ₁₀ H ₁₆) _n
	I.	II.	
C =	88.22	88.21	88.23
H =	11.62	11.70	11.77
	99.84	99.91	100.00

Here, then, the oxygen was eliminated, and the nature of a terpene established for the oil.

In order to ascertain the molecular weight a vapor density determination after Victor Meyer's method was made. The amount of oil under examination was .0269; anthracene was used in the outer bath, as it was necessary to obtain a temperature of over 270°. After volatilizing the oil, a volume of gas of 6.8 c.c. was observed at a temperature of 21.5°.

After making the necessary corrections as to pressure and temperature, a molecular weight of 198.36 was calculated. Taking the formula (C₁₀H₁₆)_n and making $n = 1\frac{1}{2}$, *i. e.*, C₁₅H₂₄, we have :

C ₁₅ = 15 × 12 =	180
H ₂₄ = 24 × 1 =	24
Together	204

This figure agrees within the limit of experimental error with the figure 198.36, so that the nature of a sesquiterpene, C₁₅H₂₄, is established for this larger part of the volatile oil of *aralia nudicaulis*.

The following color tests were observed: One drop of the sesquiterpene dissolved in 5 grammes of chloroform showed, on addition of one drop of sulphuric acid, a purple red color, gradually turning darker. One drop dissolved in 5 grammes of glacial acetic acid showed, on addition of one drop of sulphuric acid, a light wine-red color, darkening on standing. In both cases the darkening of the colors was accelerated by addition of more sulphuric acid and on warming.

One part of the terpene was dissolved in three parts of glacial acetic acid and mixed with equal parts of glacial acetic acid previously saturated with dry hydrochloric acid. A rose color was observed, gradually turning purple, and later, in about ten minutes, a beautiful sky-blue. This color remained permanent. On distilling this blue compound in vacuo, a blue liquid passed over at 140°, too small a quantity, however, to subject it to further examinations.

The sesquiterpene was dissolved in three parts of ether and dry hydrochloric acid gas conducted into the mixture, which soon turned purplish-red, gradually growing darker, almost black. The

ether was then allowed to evaporate, leaving a dark addition product of a thick oily consistency ($C_{15}H_{24} \cdot HCl$); crystals could not be obtained. By treating this hydrogen chloride compound with a solution of sodium acetate the sesquiterpene was regenerated.

A bromine addition product was obtained in the following way: One volume of the oil was dissolved in a mixture of four volumes of alcohol and ether, and one volume of bromine dissolved in the same menstruum added, keeping the mixture cool. After evaporating the alcohol and ether a dark green substance ($C_{15}H_{24}Br$) was obtained, insoluble in alcohol, soluble in ether. Efforts to crystallize it were not successful.

The boiling point of the oil, after making the necessary corrections as to pressure and temperature of the laboratory, was found to be 270° . Its specific gravity is $\cdot 9107$ at 18° and $\cdot 9086$ at 20° . Its index of refraction at 18° is $N_{[D]} = 1.49936$.

To determine its influence on polarized light, a solution in benzol had to be used, as not a sufficient quantity of the oil was at hand to fill the tube of the apparatus. The following observations were made:

Percentage of Solution.	Density.	Observed Angle.	$[\alpha]_D$
37.08	.8904	-4.9°	-7.42
27.57	.886	-3.5°	-7.20

These two observations agree fairly well, showing that the substance is laevo-rotatory and $[\alpha]_D$ between -7 and -8 .

Efforts were made to obtain a crystallizable derivative, by employing various methods as described by Wallach and others, but without success. Nitroso- compounds were formed of an oily appearance. The following is a summary of the investigation:

The volatile oil of *aralia nudicaulis* consists principally of a sesquiterpene, $C_{15}H_{24}$, and an alcohol, $C_{15}H_{25}OH$ (?); a small quantity of azulene is also present. The sesquiterpene has a specific gravity of $\cdot 9086$ at 20° ; boiling point, 270° , $[\alpha]_D = -7$ to -8 ; $N_D = 1.49936$. It forms oily compounds with HCl and Br , and derivatives with nitrous acid. Treated with hydrochloric-acetic acid it forms a compound of a permanent blue color. Chloroform and sulphuric acid produce a purple red color, acetic acid and sulphuric acid a wine-red color.

According to these reactions and properties, this sesquiterpene differs from those isomeric compounds that have been identified and the name *Araliene* may be proposed for it.

ON DIGITOXIN AS THE ACTIVE PRINCIPLE OF DIGITALIS.

BY JOSEPH W. ENGLAND.

It is not the writer's intention to endeavor to solve the many perplexing statements that have been made, especially in recent years, regarding the exact chemical nature of the proximate principles of digitalis leaves. But there is one matter that should be set right by pharmacological data, and that is the clear impossibility of *digitoxin* being the dominating therapeutic principle of digitalis, as has been claimed.

Since Schmiedeberg wrote his paper on the subject in 1875 (*Arch. exp. Pathol. un. Pharm.*, 3, 15), the accuracy of his work on the chemical composition of digitalis leaf has not been questioned, until recently.

Kiliani reported, in 1892 (*Archiv. der Pharm.*, 230, p. 250, *vide Pharm. Jour. and Trans.*, June 25, 1892, p. 1061, *AM. JOUR. PHARM.*, 1892, 415), that "the digitalin of Schmiedeberg is a distinctly individual substance which possesses, in a marked degree, the characteristic property of acting upon the heart." Further, he said: "Analysis gave results agreeing with those obtained by Schmiedeberg, which lead to the formula ($C_5H_8O_2$). This agreement may be taken as strong evidence that Schmiedeberg's digitalin was a chemically individual substance. However, the best support of this view is furnished by the behavior of digitalin with dilute hydrochloric acid. The substance is thus split up very definitely into digitaligenin, glucose and digitalose. When pure digitalin is used, the first-named product separates at once in fine crystals, but when the material operated upon contains some of the other glucosides, the digitaligenin cannot be made to crystallize at all, or only by very tedious operations."

In 1892 Kiliani reported (*AM. JOUR. PHARM.*, 422) upon the pharmacological testing made by Professor Boehm, of Leipzig, with Schmiedeberg's digitalin.

Professor Boehm found that this digitalin, administered to frogs in 0.5 milligramme doses, produced systolic stoppage of the heart after fifteen to twenty minutes. Intravenous injection of 2 milligrammes in dogs caused increase of blood pressure with reduction of the frequency of the pulse and the increase of its volume. Double the

dose caused arrhythmia, and after a short time sudden cardiac arrest. The same effects were produced on cats. Rabbits were found to be less sensitive. At the place of injection no inflammatory change could be detected. Human subjects under the care of Dr. Mottes, of Munich, gave physiological effects without the occurrence of disagreeable or dangerous symptoms. Professor von Ziemssen also tried the digitalin in the Munich Hospital, and obtained very good results.

After this, however, Kiliani radically changed his views and claimed that Schmiedeberg's active principles were, in several instances, impure products, that is, mixtures; that digitalis *leaves* contained neither digitonin nor digitalin, but the glucoside digitoxin; that the glucosides digitalin and digitonin are present in the *seeds*, but not in the leaves, and that digitonin is quite insoluble in water, and that the existence of digitalein is extremely doubtful. In other words, that digitoxin is the only important constituent of digitalis leaf (*Archiv. d. Pharm.*, 1892 to 1896, inclusive, through *American Druggist*, 1897, 68).

In 1895 (*Arch. d. Pharm.*, 1895 (No. 4), 311, 320, *vide* A. Ph. A. Proceedings, 1896, 825) Kiliani reported obtaining from digitalis leaves a substance identical with, or closely related to, the digitoxin of Schmiedeberg, and provisionally termed it *b* digitoxin. It was present to the amount of 0.1 per cent., was alleged to be a glucoside, and was obtained in a crystalline state. In 1896 Kiliani reported (*Arch. d. Pharm.*, 234, No. 7, September 10, 1896, 481, 489, *vide* A. Ph. A. Proceedings, 1897, 735) that experiments had shown that Schmiedeberg's digitoxin and the digitoxin which he had isolated during the previous year, and provisionally named *b* digitoxin, were positively identical.

In 1897 C. C. Keller's conclusions (*Berichte d. Deutsch. pharm., Gesellsch.*, 7, 125, *vide Pharm. Journal, vide* A. D., August 10, 1897, 70) on the subject of the chemical principles of digitalis leaves were that they contain a digitalin, a digitoxin and a digitonin identical with products from digitalis seeds, but in somewhat different proportions, the amount of digitoxin in the seeds being much smaller than that in good leaves, but varying much in different samples of leaves, or from 0.26 to 0.62 per cent. Keller writes that the unsatisfactory results obtained with the digitalin prepared according to the method described by Kiliani (see *Pharm. Journal*,

55 (1896), 29) have again attracted attention to digitoxin, which latter is alleged to be the most potent constituent of digitalis leaf, and then makes a plea for standardizing digitalis preparations on the basis of the amount of digitoxin they contain.

Replying to a criticism by Keller, of his results of investigation concerning the constituents of digitalis leaves, Kiliani claims that digitalis leaves contain, besides digitoxin, a crystallizable glucoside in considerable quantities, which, like digitoxin, is soluble in chloroform, and which also produces, with solution of iron in glacial acetic and sulphuric acids, the blue color regarded by Keller as characteristic of digitoxin. Kiliani proposes for the new substance the name of digitophyllin, and gives its physical and chemical properties (*Arch. d. Pharm.*, Aug. 17, 1897, 525-429, *vide Proc. A. Ph. A.*, 1898, 795).

Professor Boehm, while in general acknowledging the value of Keller's method for the estimation of digitoxin, warns against an absolute reliance upon it, as, in his opinion, the efficacy of digitalis depends not alone on the digitoxin present, but rather on the sum total of all its constituents (*American Druggist*, June 25, 1898, 342; from Gehe & Co.'s *Bericht*).

According to Kiliani, the leaves of digitalis contain neither the so-called *Digitalin verum* (*i. e.*, Schmiedeberg's digitalin) nor digitonin, while Keller (*Ueber die Wertbestimmung von Drogen und galenischen Präparaten*. Diss. Zurich, 1897) states that *digitalin* and *digitonin* are present. M. Cloetta has gone into this knotty problem, and finds that the leaves, as well as the seeds, contain *digitalin*, *digitoxin*, *digitonin*, and *coloring matter common to both*. He did not find any *digitalein* in the leaves. The seed contains much more *digitalin* than *digitoxin*, while the leaves contain less (1898, *Arch. exp. Pathol. u. Pharm.*, 41, 421, *vide AM. JOUR. PHARM.*, 1899, 90).

From this it will be seen how hopelessly at variance the authorities are upon the subject of the actual chemical nature of the proximate principles of digitalis leaves.

There is one phase of the controversy, however, which may be profitably considered. If it be true that digitoxin represents the medicinal virtues of digitalis leaf, it follows that it should give clinically all the therapeutic results yielded by the leaf or its preparations, and as promptly. Further, if this is so, it is apparent, since digitoxin is wholly insoluble in water, that the infusion

of the leaf is wholly destitute of the representative principle of the leaf, and consequently of medicinal worth; yet there are physicians who use the infusion of the leaf to the exclusion of its other preparations. Against this fact it is contended (*Pharmaceutische Rundschau*, 1898, 603, *vide* *AM. JOUR. PHARM.*, 1899, 145) that, while "pure digitoxin is insoluble in water, yet from the infusion of digitalis considerable quantities are obtainable," and in explanation of this seeming paradox it is claimed that the other glucosides of the leaf form *digitoxin on its digestion with water*. But how this makes water-insoluble digitoxin soluble in water is not explained. The infusion made by *cold* water maceration (which can contain no digitoxin) is better clinically, in the writer's experience, than the hot water product (*A. J. P.*, 1892, 361).

Now, without denying that digitoxin may be the most distinctive *chemical* substance in digitalis leaf, it is very clear, from the recently reported experiments of Dr. Karl Hofmann (*Wiener klinische Wochenschrift*, 1896, No. 42, 939, *vide* *The American Journal of the Medical Sciences*, 1897, 107), and the pharmacological results previously given by the writer in this journal, that the entire therapeutic activity of the leaf cannot be due to digitoxin.

Dr. Hofmann reports results had with the use of digitoxin in fifty-nine cases—three instances by the mouth, thirty-seven by subcutaneous injection and nineteen by enemata. He confirms previous investigators in referring to its insolubility in water and the vigorous local irritation caused by its use. The injections are followed by local burning pain, lasting from one-half to three or four hours, and redness for two or three days, which is sensitive to pressure. Inappetite, nausea, vomiting and pain in the epigastrium occurred in one-fourth the cases, whether subcutaneous injections or enemata were administered. The most remarkable fact, however, was the *length of time* reported as having elapsed before physiological effect was manifested. After the first dose, six hours were required to increase pulse-force and lessen dyspnoea, while twelve hours were required to produce diuresis. With enemata these changes required twenty-four to thirty-six hours.

From a therapeutic point of view, it is clearly impossible to believe that a drug or preparation that yields physiological effects in about thirty to sixty minutes has for its most important constituent a proximate principle, whose physiological effects are not manifested in from six to thirty-six hours.

Without discussing Kiliani's claims as to the absence of digitalin, digitonin and possibly digitalein in digitalis leaf, it seems clear from Hofmann's experiments with digitoxin—its difficulty of absorption, the length of time necessary to yield cardiac and renal effects, its slowness of elimination and the relative rapidity of absorption of digitalis tinctures—all preclude the acceptance of Kiliani's claim that digitoxin is the most important therapeutical principle of digitalis leaf.

The severe local pain following hypodermic injections of digitoxin, the prolonged sensitiveness of injected tissues and the slowness of physiological effects indicate a great difficulty of absorption and assimilation, so much so that one is led to ask the question: "Is it not probable that the water-insoluble digitoxin is absorbed not as digitoxin, but as water-soluble decomposition product or products?"

Digitalis is sometimes cumulative in action. When taken for a long time there are occasionally exhibited symptoms without any increase in the use of the drug. This has been thought to be due to the fact that the proximate principles of the drug were not excreted by the kidneys as fast as absorbed, and that they therefore accumulated in the body. But from the experiments detailed above, and in my paper on Tincture of Fat-free Digitalis, it would seem to be more reasonable to believe that cumulative action, where existent, is due to the slow absorption and elimination of digitoxin. With a bed-patient, a good tincture of digitalis, for example, should yield primary effects in from 15 to 30 minutes, and full effects in from 45 to 60 minutes. Digitoxin, however, on hypodermic injections, requires, before any effects are shown, 6 hours and over. Now, if a large number of doses of a digitalis tincture are given, and the use of the drug is withdrawn, may not the accumulated digitoxin (of the tincture) by absorption give rise to the dangerous symptoms which are called the cumulative effects of digitalis?

ARTIFICIAL FOODS; WHY THEY EXIST AND WHAT THEY ARE.

BY J. PERCY REMINGTON, B.S. (U. of P.).

In this paper an endeavor will be made to discuss, in a practical manner, the subject of Artificial Foods, touching upon the reasons

for their existence, the principles of their use, the composition and manufacture of the various kinds, and the great possibilities which are open to this comparatively new form of nourishment which is now occupying so much of the attention of the medical men and scientists of the world, and the utility of which we are just beginning to realize.

Artificial foods so far have found their greatest use as a substitute for human milk in infant feeding, and although they are sometimes used in diseases of adults, yet, since there are many other forms of diet which can be employed in such cases, they have not found as extensive an application in this field.

It is a well-known fact that among the more cultured classes mothers frequently do not have a sufficient quantity of milk to suckle their young, whereas among the poorer classes, for instance, the peasant women of France and Germany, this statement does not hold true, and it has been this fact that has forced us to find some substitute which could take the place of human milk and supply all those ingredients which are necessary for the perfect development of the young.

The belief has been entertained that a paper on this subject would be of interest to the Pennsylvania Pharmaceutical Association at this time, because pharmacists are probably more frequently consulted by parents than even physicians, and the future welfare of our race, in a measure, depends upon the raising of the children. This, therefore, becomes a subject upon which none can afford to be ignorant.

Although much has been written upon this subject by authorities all over the world, no one has so far undertaken to collect this scattered knowledge into one book, so that, in order to get a complete understanding of it in its physiological, medical, chemical and commercial aspects, it is necessary to refer to many text-books, journals and even note-books. Nor do the authorities all agree on many of the vital points concerning the best methods of artificial feeding, and the various physiological phenomena which take place in that most fearfully and wonderfully made organism—the human body. In other words, this subject has not yet been reduced to a science.

We can best approach this question by beginning with the general subject of foods for man, touching upon the various kinds, their

use, their composition, and the process by which they are converted from their crude state into forms serviceable for the maintenance of life.

Food is that "which is eaten for nourishment." Man's food consists of animal, vegetable and mineral matter, and must supply a sufficient amount of proteids, carbohydrates, fats, mineral salts and water to completely repair the waste that is continually taking place and allow the organism to grow.

Various foods supply these elements in different proportions, and are useless or valuable according as they contain more or less of the essentials, and any food which possesses these five substances in proper proportions is capable of perfectly sustaining life, for each supplies the necessary material for the development of tissues, nerves, glands, juices, fat, bones, ligaments, etc., and for the maintenance of the bodily temperature, and the production of energy.

The proteids or albumenoids contain nitrogen and supply the elements for the foundation and repair of the tissues, brain, muscles, nerves, glands, blood corpuscles, and the resisting power against disease. Protoplasm, the centre of cell life, is formed of and nourished by proteids. They are therefore the most important elements in our food, and are the only ones, when used alone, that are capable of sustaining life.

They may be of animal or vegetable origin, such as egg, meat, milk and the gluten of cereals.

The fats and oils are second in importance, as they supply by combustion the heat necessary for the body, and without which the activity of the juices, the digestive ferments and many of the chemical reactions taking place in the body would be destroyed. They also are the main source of our energy, or, to use a crude simile, they are the oils burnt as fuel to keep the engine running. They may be of vegetable or animal origin, as lard, tallow, butter, olive or cotton seed oil.

The carbohydrates are the next in importance and are employed in the production of fat chiefly, although they also assist the fats in contributing to the production of heat and energy.

They also may be of animal or vegetable origin, although chiefly of the latter, as cane sugar, starch and milk sugar.

The salts supply the chemicals necessary for the formation of

bones and the juices, and are derived from both animal and vegetable sources.

Water is the last but not the least in importance, as about 70 per cent. of our body weight is composed of it, and from 75 to 80 ounces per day is needed. It serves for diluting the fluids of the body, for moistening mucous surfaces, as a solvent for food and a distributor and regulator of heat, and enters into all chemical reactions that take place in the body.

There are very few foods which can be directly utilized by the human economy without first undergoing a process of physical and chemical change or digestion.

This process takes place in various stages in the alimentary canal. In the mouth the food is mechanically subdivided, ground up and masticated, in the stomach it is thoroughly mixed with the digestive juices and allowed to pass a little at a time into the intestines, where the valuable material is extracted and absorbed. In other words, in this great factory the mouth is the mill room, the stomach the laboratory, and the intestines the shipping department where the products are carefully selected, classified and distributed throughout the various parts of the body.

As the use of proper food is the source of our life and health, so the use of improper food may be the cause of disease, and in such cases the best cure is the removal of the cause by the substitution of proper feeding. Hence we see food acting in the double capacity of a means of nourishment and a medicine. It must not be confounded with medicine, however, which is a remedy for disease, but it is very convenient when we can, by selecting a proper food, promote life and cure disease at the same time.

A very large proportion of the diseases of children results from some form of insufficient or improper feeding, and as very often the evil effects then produced are carried on to maturity and show themselves in dyspepsia, indigestion, deformities, etc., the question of dietetics assumes a very serious aspect. It is for this reason that artificial foods have been received with so much favor by physicians, and the subject has received such careful consideration. It is very fortunate that so much is being said and done in this direction, for a practical knowledge of the feeding of infants and of the sick is of the most vital importance to mothers, nurses and the general public, and it is just as necessary to know what to avoid as what to eat.

Having taken up the question of foods in general, their composition, the importance, specific uses and the relative value of the five ingredients, proteids, fats, carbohydrates, minerals and water, let us consider the various forms of artificial foods on the market, remembering that they are valuable only as they supply the above essentials in the requisite proportions, in a form physiologically capable of digestion and sufficiently palatable to be eaten.

The first substitute that is naturally employed for this purpose, because of its similarity to human milk, and its accessibility, is cow's milk. For adults it can be used fresh and without dilution, and is employed very extensively in this way, but for infants it is generally diluted by the addition of two parts of water to one of milk.

Theoretically this is the best and most serviceable substitute that can be used, and for this reason milk laboratories have been established in the large cities of this country for the purpose of furnishing pure sterilized, modified milk of any desired proportion of casein, cream and lactose. The milk of goats, asses and mares has been employed as a substitute with some success, but owing to practical difficulties can never have any very extensive use. Cow's milk, no matter how carefully modified and prepared, cannot be taken by all children, largely on account of the following facts: The casein is present in a much greater proportion than in mother's milk, is not nearly as digestible, as it coagulates in heavy masses instead of the fine flocculent curd of human milk. It is deficient in milk sugar, contains many bacteria, including some pathogenic varieties, is acid in reaction, whereas human milk is persistently alkaline, and is open to the two practical objections, that it requires care in keeping, and trouble in modification and preparation.

It would be impossible to take up and describe each different food upon the market in detail, and do justice to all, so for purposes of study it will be most convenient to divide them into general classes.

The points which it will be worth our while to consider can best be taken up under the heads of composition, method of manufacture, and the advantages and disadvantages they seem to possess. It would be well to also bear in mind that the theories upon which the composition of the foods of commerce is based, although necessary to their existence and useful for advertising

purposes, are, nevertheless, not to be considered always as based upon fixed, definite and accepted laws, and the best food for a child or an adult is the food that, after many trials, gives the best practical results, no matter what theory it may represent, or what may be claimed for it. The old adage: "What is one man's meat is another's poison," is applicable to this condition, and the bare truth, established by practical experience, remains, that there is no artificial food which will infallibly suit every case.

Manufactured foods may be conveniently divided into the following classes: predigested foods, milk foods, cereals and complete foods.

By milk foods we mean those which are prepared from cow's milk, the chief representative of which is condensed milk. It is prepared by slowly evaporating off the water at a moderate heat in vacuo till the milk has assumed a syrupy consistence. There are many brands of condensed milk on the market, and may be of two varieties. The "plain," which is condensed to about one-fourth its bulk, with the addition of a small amount of cane sugar, and the "stronger," in which the condensation is carried further, and a much larger quantity of cane sugar is added, sometimes running as high as 70 per cent.

This makes a very cheap food and is easily prepared, requiring only dilution, and is quite palatable, and hence is used largely among the poorer classes. It is somewhat laxative in its effect, which is an advantage quickly realized by the nurse. Condensed milk, however, is not a satisfactory food for permanent use. Children fed on it thrive very well for a time and rapidly gain in weight, but the flesh formed is flabby, with large amount of fat, and it has a tendency in time to produce rickets, marasmus and general symptoms of malnutrition.

Another form of milk food is that which is prepared by predigestion by some ferment, such as pepsin or pancreatin. There are very few foods of this kind upon the market, as their field is very limited. They find their best use as a temporary expedient after surgical operations or where the alimentary tract is so impaired that digestion becomes impossible, and it is necessary to give some food which can be directly absorbed without any effort on the part of the invalid.

When, however, they are employed for permanent nourishment

they are detrimental and demoralizing, for they encourage the digestive functions to become lazy and finally rob these organs of their ability to obey the commands of nature. Thus we impair instead of developing and strengthening vital parts of the body.

There are also condensed creams and peptonized condensed milks on the market which combine the features of the two above classes, but are not very important.

Among the other foods of animal origin, although of more recent application, are those prepared from beef.

Of the many beef juices on the market it will suffice to remark that they furnish very concentrated nourishment, since most of the indigestible fibre, muscle sheaths, bloodvessels, etc., are removed in the process of manufacture, and water is driven off by evaporation. They have quite an extensive use, but mostly for adults, being very seldom used for children except as an addition to milk or other food.

Eggs offer a remarkably efficient form of nourishment, as they contain proteids and fat in a concentrated and assimilable form, are easily procured and prepared and quite palatable.

Fresh eggs have always been a very popular food for both adults and infants as an addition to milk and other kinds of diet.

During the last few years attention has been called to the value of eggs as a substitute for the indigestible casein in milk foods, on the grounds of their digestibility and nutritive value. There are three strong points in favor of the egg as an ingredient of artificial food.

(1) That when it is desiccated and finely powdered it is effectively preserved against decomposition.

(2) It forms very fine and flocculent masses on coagulation, and hence gives the greatest freedom to the digestive juices to act upon it, and

(3) That it exerts an active influence upon the mucous membrane of the stomach, allaying irritation and soothing inflamed surfaces.

The greater number of artificial foods belong to that class in which cereals are used as the basis.

These prepared farinaceous infant foods are made by the following methods:

(1) Application of heat alone.

(2) Digestion with malt or diastase combined with heat.

(3) Addition of animal matter to cereals after dextrinization.

The first class comprises all those foods made with cereals alone and intended to be used as modifiers of cow's milk.

Wheat, barley and oats are the grains used in their manufacture, and the starch present, often amounting to 75 per cent., is partly dextrinized by the cooking, cellulose and indigestible matter being more or less completely removed in the process. All that can be claimed for these foods is that they are a useful addition to cow's milk for adults and older children, but contain too large a percentage of starch to be of value for young children, as very few infants develop the ability to digest starch till the sixth month.

In justice, it must be said, however, that practical experience seems to show that a small percentage of starch is not only often digested by infants, but has a very beneficial, mechanical effect in increasing the peristaltic action, exerting a laxative tendency and aiding digestion.

The second class, the malted foods, had their origin in the theories, and are the result of the experiments of Liebig, and for that reason are often called "Liebig Foods."

They are made of equal quantities of wheat flour and barley malt with a little bran and about 1 per cent. of potassium bicarbonate added. These ingredients are mixed with water into a paste and allowed to undergo fermentation, which converts the starch into soluble carbohydrates, maltose and dextrin. The mass is then strained, pressed, extracted with water and evaporated, dried and powdered. In some of these foods a small percentage of starch still remains. The general characteristics of these foods are complete solubility, a strong and sweet taste, agreeable to most people, but which may, by constant use, become nauseating. They are easily assimilable, require little digestion and are quickly prepared. They are not complete foods, however, as they contain little or no fat and no animal proteid, although there is albuminous matter present in the form of gluten. They are, therefore, not to be used alone, but, like the first class, should be prepared with milk.

In the third class of foods an attempt is made to supply both vegetable and animal matter, or, in other words, to make a complete food; they are of the more recent manufacture and are the result of the practical experience of the manufacturers of the previous class of foods.

This class does not comprise a large number of products, but has

met with greater favor and is certainly a step in the right direction.

They are of three kinds :

(1) Such as are composed of an extract of barley and wheat, to which powdered, dried and predigested milk is added.

(2) Those composed of dextrinized cereals and unpredigested dried milk.

(3) Those composed of dextrinized cereals, sugar of milk and desiccated powdered egg.

The first kind, that made from predigested milk and an extract of cereals, is similar to the malted foods, having a strong and sweet taste, but is to be taken with hot water only, and hence is easily prepared, and has found a very extensive use, particularly among adults.

It, however, is deficient in fat, containing less than 1 per cent., and the presence of such a large quantity of sugar is likely to produce fermentation in the stomach and intestines. The effects of these foods are manifested by the rapid production of fat and a gain in weight, and children may even be reared upon them exclusively, but as they possess no antiscorbutic property they are likely to produce scurvy. Moreover, these foods are open to the same objections that predigested foods are, namely, that their ingredients, being converted into already assimilable forms, do not allow the digestive juices to perform their proper functions.

The second class seems to be open to less objection on this ground, as neither the cereals nor the milk are predigested during their manufacture. In other respects they resemble the preceding closely, except that they require cooking before administration.

The third form, foods made from dextrinized cereals and desiccated egg, rely upon the substitution of egg-albumen for the less easily digestible casein, the dextrinization of the cereals by a double process of cooking (first being boiled and then baked), and are milk foods only in this sense, that sugar of milk alone is present. They possess the following advantages over the others:

They are of a mild, palatable taste, not excessively sweet (as they contain no sucrose or maltose), the casein is replaced by the more digestible egg-albumen and they are not predigested. They are open to these two practical objections, that like the second class they require cooking in their administration and are also deficient

in fats. For this reason milk and cream must be added, the milk supplying the antiscorbutic property.

We have now covered all the classes of artificial foods and have discussed their composition and utility in the light of the laws laid down as the result of practical experience by the authorities on this subject, and in conclusion we find that they are all more or less useful, but that they all possess certain definite defects. That no one can tell whether a certain food will be successful in any certain case till it has been tried, and that, as we have said before, the best commercial foods are those which supply the five essentials in the requisite proportions, in a form physiologically capable of digestion and sufficiently palatable to be relished. It is clear, then, that since none of these foods meet all these requirements completely, the problem of artificial feeding has not yet been completely solved.

Yet one cannot glance through any of the best pharmaceutical or medical journals or literature of to-day without noticing the articles written on this subject by the most noted scientific men, and without realizing that science and art are combining their forces and exerting the greatest activity in the attempt to solve this problem.

Judging from the great interest that this subject has excited, not only among the scientific classes, but with the community at large, resulting in a universal demand for a perfect artificial food, and considering the unlimited resources of this country and its people, the great possibility of supplying this demand, and thus meeting our obligations to humanity, seems almost within our grasp.

LABORATORY NOTES.

BY CHARLES H. LAWALL and ROBERT C. PURSEL.

The records of the analytical department of a large wholesale and manufacturing establishment are of great value in indicating the average quality of the goods upon the market. The publishing of such notes from time to time serves to keep other analysts posted on the character and extent of the adulteration noted, for when a lot of goods is rejected by one house the seller does not destroy the goods, but tries others until he disposes of them. Thus, it will be seen that adulterated articles eventually reach the retailer, and through him the consumer, and the only way of preventing this is the enforcement of the laws regulating the quality of various substances by establishing standards to which they must conform.

The increasing watchfulness of commercial houses who look after the quality of all articles supplied to their customers, together with the fact that at the present time graduates in pharmacy are thoroughly able to perform all the analytical operations necessary to determine the purity of the drugs and chemicals handled by them, has made it almost impossible for gross adulterations to exist, and it is very evident that adulteration is now done in a scientific manner by persons who are well informed as regards the tests applied to a given substance.

The following notes concerning some of the articles of common occurrence in commerce are not to be regarded as possessing any originality, but merely as a contribution which furnishes information of the commercial quality of the substances reported upon.

Flaxseed, both whole and ground, has frequently been reported as being below the standard of the U. S. Pharmacopœia in oil contents. The pharmacopœial requirements are that it shall not contain less than 25 per cent. of fixed oil when extracted with CS₂.

The following figures were obtained from the examinations of carload lots of the substance and show that there is some basis for the suspicion that the oil is partially extracted from the meal before placing it on the market. Three lots of whole flaxseed showed the following percentage of oil extracted by CS₂:

	Per Cent.
(1)	35'28
(2)	37'00
(3)	38'40
Average, 36'87 per cent.	

Nine lots of the meal gave the following figures:

	Per Cent.
(1)	21'96
(2)	24'83
(3)	25'24
(4)	22'72
(5)	26'48
(6)	34'08
(7)	26'55
(8)	25'20
(9)	26'62

Minimum, 21'96 per cent.; Average, 25'96 per cent.; Maximum, 34'08 per cent.

Creolin first appeared on the market of a particular brand, designated Creolin-Pearson. Of late bulk lots have been examined

which vary greatly in specific gravity from the original product mentioned above.

	Sp. Gr. at 20° C.
<i>Creolin Pearson</i>	1'0422
<i>Creolin</i> .—(1)	1'0755
(2)	1'0752
(3)	1'0758
(4)	1'0748
(5)	1'0732
(6)	1'0768
(7)	1'0769
(8)	1'0780
(9)	1'0669
(10)	1'0675
(11)	1'0676
(12)	1'0651
(13)	1'0623
(14)	1'0643
(15)	1'0640
(16)	1'0734
(17)	1'0724
(18)	1'0691
(19)	1'0702
(20)	1'0692
(21)	1'0676

The range being from 1'0623 to 1'0780, which is noticeably higher than the original article. Average, 1'0711.

Gamboge.—A lot, aggregating 35,000 pounds, was examined recently, which fully complied with the U.S.P. requirements for absence of starch.

Belladonna Leaves.—Ten samples of belladonna leaves, for which the commercial standard of 0.40 per cent. alkaloid has been established, gave figures as follows:

	Alkaloid Moist by Acid Titration. Per Cent.	Moisture. Per Cent.	Alkaloid Dry. Per Cent.
(1)	0.343	7.74	0.372
(2)	0.310	9.06	0.343
(3)	0.370	8.18	0.404
(4)	0.375	7.65	0.407
(5)	0.260	9.54	0.289
(6)	0.430	6.62	0.460
(7)	0.371	8.80	0.407
(8)	0.264	9.20	0.291
(9)	0.220	8.67	0.241
(10)	0.313	7.75	0.340
Average	0.3227	8.32	0.3525

The low average would indicate that the standard had been placed too high for this drug.

A very material reduction in the time of assay was accomplished by titrating directly from the first chloroform-ether residue, as in the case of *nux vomica*. The presence of so much chlorophyll has always proved a hindrance to the successful performance of this method, as the end-reaction is totally obscured.

In the process used the first chloroform-ether extract was evaporated to dryness, and several portions of ether were added successively and evaporated, which removes all trace of ammonia. A small amount of alcohol is added and an excess of $\frac{1}{10}$ acid solution is run in from a burette, the amount being carefully noted. A large amount of water is now added and, lastly, about 10 or 15 c.c. of chloroform and the whole is well stirred. After several minutes' standing it will be found that the heavier chloroformic layer contains all of the fatty matter together with the chlorophyll and the supernatant aqueous liquid is practically colorless. The desired indicator may now be added and titration successfully carried out.

Potassium cyanide, a chemical much used in the arts, is one of the substances frequently giving the analyst trouble from the presence of some impurity which causes a darkening of the solution when titrated with silver nitrate v. s., thus obscuring the end-reaction.

Another difficulty encountered in reporting upon this substance is due to the presence of sodium cyanide, which requires a lower factor for calculating the per cent. when titrated, the result being that when titrated and calculated as KCN, more than 100 per cent. of that substance is indicated, exclusive of carbonates and moisture, which are always present to some extent. It is difficult to make some customers appreciate the fact that, while it is impossible for it to contain more than 100 per cent. of KCN, the presence of the sodium salt makes it equal to more than its own weight of KCN in actual working value.

The following figures show the range in KCN value of this article, the commercial having a standard of 30 per cent., and the U.S.P. 90 per cent.:

	Commercial. Per Cent.	U.S.P. Per Cent.
(1)	25.48	97.53
(2)	24.94	99.09
(3)	27.60	93.34
(4)	28.16	91.15
(5)	27.20	100.05
(6)	25.10	100.40
(7)	27.97	97.70
(8)	28.60	97.51
(9)	22.98	98.24
Average	26.45	97.22
Minimum	22.98	91.15
Maximum	28.60	100.40

Turpentine.—The turpentine examined during the past year conformed in nearly every instance to the U.S.P. requirements. The odor and general appearance are taken into consideration when passing upon samples of this substance, as well as the specific gravity, boiling point and other U.S.P. tests.

Twelve lots examined, aggregating about 400 barrels, gave the following results:

	Specific Gravity.	Boiling Point.	Residue.	Solubility.
(1) . . . . .	.8590	155°-172° C.	slightly abnormal	O.K.
(2) . . . . .	.8591	154°-170° C.	"	"
(3) . . . . .	.8583	156°-170° C.	normal	"
(4) . . . . .	.8661	155°-168° C.	"	"
(5) . . . . .	.8630	150°-157° C.	"	"
(6) . . . . .	.8572	156°-160° C.	"	"
(7) . . . . .	.8561	158°-160° C.	"	"
(8) . . . . .	.8564	155°-169° C.	"	"
(9) . . . . .	.8555	155°-166° C.	"	"
(10) . . . . .	.8651	156°-165° C.	"	"
(11) . . . . .	.8651	155°-159° C.	"	"
(12) . . . . .	.8306	80°-170° C.	abnormal	"
Average . . . . .	.8523	149°-166° C.		

Sample No. 12 contained about 25 per cent. of gasoline. Also traces of rosin were found in the residue obtained upon the evaporation of a convenient quantity.

Yellow Wax.—Probably no article in the Pharmacopœia is adulterated to the extent that yellow wax is. A product can very easily be made up by using Japan wax, tallow, paraffin, stearic acid, carnauba wax, etc., in the proper proportions, which will have the specific gravity and melting-point conforming to the U.S.P., and

can only be distinguished from pure wax by applying other than the above tests.

The following table shows the results of twelve examinations:

Specific Gravity.	Melting-Point.	Acid No.	Ether No.	Adulterant.
(1) '9560	63° C.	19'08	72'13	
(2) '9200	65° C.	7'34	17'48	{ Paraffin, Stearic Acid }
(3) '9535	63° C.	22'15	78'82	
(4) '9520	64° C.	21'45	77'08	
(5) '9200	66° C.	5'30	27'63	{ Paraffin, Stearic Acid }
(6) '9450	63'5° C.	19'40	78'99	{ Paraffin, Stearic Acid }
(7) '9540	63° C.	20'16	87'14	{ Tallow, Carnauba Wax }
(8) '9560	62'5° C.	21'30	83'53	Stearic Acid
(9) '9600	64° C.	19'41	76'95	
(10) '9558	63'5° C.	20'49	83'96	
(11) '9620	64° C.	19'14	77'91	
(12) '9400	68° C.	14'38	66'71	{ Paraffin, Stearic Acid }
Average, '9479	64'08° C.	17'47	69'02	

Oil Sassafras.—On account of the large consumption of this oil by soap manufacturers, it is handled extensively by the wholesaler. Oil which has a gravity of less than 1·07 is looked upon with suspicion, as we have reason to believe that some of the safrol is extracted before the oil is put on the market. But one lot of oil has come under our notice during the past year that did not have the desired gravity. This was a lot aggregating about 400 pounds, and had an average gravity of 1·0573.

RECENT LITERATURE RELATING TO PHARMACY.

NEW FALSE CINCHONAS.

C. Hartwich elaborately describes (*Arch. der Pharm.*, 1898, 641) four barks recently placed on the market as cinchona.

The first, designated as South American "pseudo-china," was found identical with "china bicolorata," first noticed by Brown in 1793. The writer traced its source to the genus *Antirrhœa*, N. O. Rubiaceæ, and it is apparently from the species *aristata*. This diagnosis is based on the presence of "stabzellen," and of silica crystals in the cells of the medullary rays, as well as the thickened cell

walls of the phelloderm. The bark contains an alkaloid—not, however, quinine or cinchonine. Moreover, it does not respond to Grahe's test. The second, called "china cuprea," while closely resembling cuprea bark, is not the product of a *Remijia*, but seemed a species of *Buena*. It contained no alkaloids, had the red brown color of cuprea barks, but differed microscopically by the form of the milk vessels in the primary bark, by the two sizes of sclerotic cells in the secondary bark and by the spindle-shaped cells in the base.

The third, which came from St. Domingo, was astringent and contained no alkaloid. Its microscopical structure indicated it did not even belong to the *N. O. Rubiaceæ*, as shown by the presence of large quadratic crystals of calcium oxalate. The peculiar medullary rays, occasionally but one cell wide and then at times greatly broadened, suggested its relationship to the genus *Bucida*, *N. O. Combretaceæ*.

The fourth was introduced as "*cortex chinæ von Colombia*." It contains neither tannin nor alkaloids, is in the form of quills, of yellowish-gray-brown externally and dark brown on the inner surface. Its origin could not be traced by microscopical means.

Mixed with it was another bark resembling it closely, but astringent. The axillary lengthened secretion receptacles, the calcium oxalate glands in the medullary rays and the primary bast bundles—all point to its origin from the genus *Croton*, possibly *C. Malambo*.

H. V. ARNY.

CONSTITUENTS OF FRANGULA, RHUBARB AND SENNA.

At the last meeting of the pharmaceutical section of the Swiss Society for the Advancement of Science, Dr. Aweng reported investigations on the three drugs above mentioned (*Schw. Wochenschr. für Chem. und Pharm.*, 1898, 445).

Frangula, by extraction with 60 per cent. alcohol, evaporation and treatment of extract with water, yielded two glucosides; one (primary) soluble in water, the other (secondary) insoluble. The yield of these was 20 per cent. and 12 per cent., respectively. Both, on hydrolysis, yielded, besides sugar, chrysophanic acid, emodin and a substance resembling Liebermann's rhamnetin, in all save greater solubility in alcohol. This body, which was crystallizable from alcohol and acetone, and sublimed in yellow needles, the author names *Frangularhamnetin*. The fourth product of

hydrolysis was a principle soluble in alcohol and containing iron. This the author calls "Eisen emodin."

Of these four products, he finds only chrysophanic acid and emodin cathartic.

Fermentation causes a change of the scarcely bitter, water-soluble primary glucoside into the very bitter, water-insoluble secondary. As the primary water-soluble compound has less objectionable taste than the secondary, is present in larger amounts, and is almost as potent, the author recommends aqueous preparations of frangula. He finds a glycerite, made by dissolving aqueous extract in glycerin, particularly effective.

From rhubarb he isolated, by similar treatment, two glucosides, one soluble in water and the other insoluble, similar to those from frangula. The relative quantity of the two products depends on the quality of the drug, the finest Shensi yielding 40 per cent. of the primary and 5 per cent. of the secondary glucoside, while *Rheum rhaponticum* yields 25 per cent. of primary and 37 per cent. secondary. Likewise from senna, he isolated similar primary and secondary glucosides. These bodies, however, differ from the rhubarb and frangula glucosides by hydrolyzing only to emodin and frangula rhamnetin, or a close ally. H. V. A.

EDITORIAL.

PHARMACEUTICAL EDUCATION.

It must be apparent to every one that the matter of education is, like that of success, dependent very much upon the individual. Good men graduate from poor colleges and poor men graduate from good colleges. As to what constitutes a true or proper education there are great differences of opinion. Very recently, at the commencement exercises at Cornell University, Governor Roosevelt said that collegiate training offers innumerable advantages to any one and said that college-bred men are the leaders. He did not say what kind of a college education made it possible that "our country could better afford to lose all of the men who have amassed millions than to lose one-half of its college-bred men." Nevertheless, it must be apparent that the colleges in this country that are not giving an adequate education for the general average training to their students are the exception. President Low, of Columbia University, in an address of welcome some time ago to the associates of colleges and preparatory schools of the Middle States, referred to the success of the navy in the late war as a proof of the value of educational training. The work of the navy, he said, was exceedingly effective, and that work was the result of schools where officers and men had been carefully trained in the special branches of their duty. If education can fit men to fight so successfully, he argued, it can fit men for any other purpose in life. Surely educational methods must be

better, judging from results, than many would have us believe. There is a feeling in the West, judging from what one college President is said to have said, that no college having an endowment of less than \$100,000 should be allowed to confer degrees. A prominent pharmacist is also quoted recently as having said that "what we need is fewer, but better pharmacists; not more schools, but fewer and better ones—schools that can afford to refuse, and will refuse to accept material not ripe for college work." "If," said he, "the United States had only four colleges not dependent upon political sandbaggers, nor upon the number of matriculants, but in a position to write over their portals, 'no one enters here but men who have learned to learn,' pharmacy would soon be an occupation worth following and worthy of the ambition of any young man." It will not be possible to discuss these remarks at any length. The increase in the number of colleges is dependent upon and results from the increase in population. It may be said that all legitimate schools are endeavoring to select their students and graduates not necessarily only at the entrance, but before their graduation. Each matriculant and student is having his work critically examined, and his record is based not so much on the number of correct answers, but rather on the nature and quality of these answers. It may be further said that all legitimate schools are endeavoring to be so provided by endowments that the most unselfish work may be done by teacher and the most rigorous requirements fulfilled by students. The time is not yet ripe to say that colleges must have a certain endowment, or that only they who have "learned to learn" shall be admitted. We must still do the best we can without liberal endowments and try to teach our students so as to make them competent. To put on the screws just now in the utopian fashion suggested would be worse than a bread famine or even the evils that are to be remedied.

The same speaker pleads "not for higher, but lower and broader education." As to what this speaker meant by lower and broader education is not given in the account of the address we have seen. But here again we might all differ. It is said of Russell Sage that he has always devoted about a month of each year to the study of current politics, as he has found that in no way can a man gain such useful knowledge of his fellows as he can by working in politics. Thomas Edison, the inventor, has said that if you want to succeed get some enemies. And so it goes. The problems of education, like success, are, as we have said, largely individual. One requires certain traits developed; another develops certain qualities easily, and some may never attain to any success. It is astonishing, however, as to how we differ about the terms higher and lower. The speaker advocates putting the bars so high up that only those who have learned to learn may enter, and then he would have a lower education. It seems to us that our better colleges are trying to do better than this, if not just the right thing. The universities like Columbia and Chicago, referred to and others, are putting their entrance examinations sufficiently high for the studies they teach and the objects of these institutions. Their aim is not lower but higher education. In colleges of pharmacy the entrance requirements are being made to correspond with the subjects treated. Can we realize how broad the education in our colleges of pharmacy is becoming? Mathematics, Latin, bacteriology, urinary analysis, commercial analysis are being taught, and even commercial training has recently been instituted in one college. The object of the latter course being, as stated in the announcement just issued, that "no matter how

thoroughly a student is educated scientifically and professionally, he may fail to realize the value of such education if he remains ignorant of proper business methods." The subjects to be treated of are enumerated, and then follows the statement that "no effort will be spared to cover every commercial point of the education of the pharmacist that will make him not only a valuable assistant, but fit him as far as possible for the responsible duties of a proprietor." Surely this is an education that, in connection with the other courses offered, may be considered broad enough—broad enough to qualify the graduates to become valuable assistants and responsible proprietors.

It may seem sometimes to the practical pharmacist, who is perplexed with the multitudinous things he has to do, that there must be a better way for him and for his clerks to travel. It may seem sometimes that pharmacy is an unfortunate calling, with many trials and perplexities, and few pleasures and rewards. But look around and see the bright and dark sides to every vocation. We remind those who would change existing things that things are changing, and that desirable things are being done. A great many minds to whom are entrusted the responsibilities of pharmaceutical education are quietly considering the problems of pharmaceutical education in all its phases. The light in the sky is already appearing, the clouds are rising higher and higher on the mountain side, and the students of pharmacy are ascending year by year to higher flights than those who preceded them yesterday, and they follow their teachers (and the schools) who it sometimes may seem are working in the clouds of impenetrable impracticability, yet who, nevertheless, when the light shines, are seen to be laboring for the real benefit and the lasting future of pharmacy.

REVIEWS AND BIBLIOGRAPHICAL NOTICES.

EINFÜHRUNG IN DIE PRAKTISCHE NAHRUNGSMITTEL-CHEMIE, bearbeitet von Dr. H. Thoms, Prof. in Berlin; mit einem Anhang: Botanisch-mikroskopischer Theil, bearbeitet von Dr. E. Gilg, Privatdozent d. Botanik in Berlin. Mit 115 Abbildungen. Leipzig: S. Hirzel. Gr. 8vo, 415 p.

There can scarcely be any doubt on the point that, in the majority of civilized States, serious studies and rational laws for promoting general sanitary welfare are just now in the first rank of public interest. And, to do justice to this well-founded desideratum of modern times, systematic chemical examination of food-materials belongs to the most active and hopeful means. In consequence, this branch of applied chemistry, in these last ten years and present days, is going on to be more thoroughly cultivated in the laboratories of universities and higher technical schools, especially in connection with pharmaceutical and medical university training. In fact, among men devoted to the so-called liberal or scientific professions there is, as we may fairly assert, no class more and better adapted to the pursuing of this kind of chemical and hygienical work than that of pharmaceutical chemists, who, by their early practical contact with different parts of natural history and exact natural sciences, and by the later academical studies and simultaneous training in chemistry, physics, botany, mineralogy and materia medica or pharmacology, ought to be admirably prepared and in the most favorable condition for the chemical study and detection of food adulteration. It is well known, at least

on the Continent, that the number of scientifically trained pharmacists engaged either as members of the sanitary commissions in towns or as directors and chemists in the State laboratories for food-examination, is very considerable, and will probably remain so, provided the pharmaceutical chemists do not themselves neglect this important department of their scientific education. Of course, the mentioned state of things has given rise to a pretty large flood of specified literature, viz., of ampler and shorter text-books containing the chemistry of food-materials, as well for beginners in this part of applied science as also for expert students and practitioners desirous of consulting an authentic guide in the difficulties of food-analyses. Yet a rather large number of these compendiums on food-chemistry, although containing numerous and detailed descriptions of all the newer methods of analyzing the different objects, viz., the liquid and solid materials, as wine, milk, fats, bread, etc., are in want of a really systematic instruction adapted to the comprehension of students entering into this field of analytical chemistry. The above-quoted text-book of the two German authors, in fact, deserves to be called an "introduction to the practical food-chemistry," and claims in the first line to be used for teaching purposes in the laboratory. First of all, it differs from many other similar works in containing two parts, viz., a chemical part and a section for the botanical and microscopic examination of food-materials. The first chemical part, owing to the principles just mentioned, begins with the description and explanation of all more important general methods of chemical testing and determination of certain bodies, like nitrogen, water, ashes, fat, tannic acid, alcohol, volatile oil's, sugar, albuminoids, etc.; the following second division of the chemical section contains all the data and methods concerning the chemical testing of the chief food-materials and drinks. It has been the aim of the authors to care for a selection of such newer methods which are of real value for students, and which, by practical experience of the last years, have proved relatively faultless and reliable.

Both chemical sections of the book are freely illustrated by well-executed woodcuts, and followed by a series of tables for calculations.

The second part of the book, botanical and microscopic, has been founded on the same plan, beginning with a short explanation of the methodic examination of the vegetable tissues of food-substances, and proceeding then to the anatomical characters of raw and powdered materials, as, for instance, coffee, tea, cocoa, pepper, saffron, ginger, mushrooms, etc. The text of this part also, as may be expected, is not devoid of good illustrations, which, together with an excellent print, do every justice to the blameless typographical quality of the present book. We think this truly practical compendium will be observed and gain friends also among American and English pharmaceutical chemists conversant with German language.

ED. SCHAEER.

STRASSBURG, GERMANY, June, 1899.

ANNUAL AND ANALYTICAL CYCLOPÆDIA OF PRACTICAL MEDICINE.—By Charles E. de M. Sijous, and one hundred associate editors, assisted by corresponding editors, collaborators and correspondents. Illustrated with chromolithographs, engravings and maps. Vol. III. Philadelphia, New York and Chicago: The F. A. Davis Company, Publishers. 1899.

The first two volumes have been reviewed at length in this JOURNAL. The

articles in Volume III extend from Dislocations to Infantile Myxœdema. The plan of giving special space to subjects calculated to elucidate, by the close analysis involved, many obscure phases of pathogenesis, has been continued in this volume. The articles on "Infantile Myxœdema (Cretinism)" by Professor Osler and Dr. Norton; "Exophthalmic Goiter," by Professor Putnam, and "Goiter," by Professor Adami, thus form a trio which may be said to point to much of the progress that is to attend medicine in the near future. The practical value of the work is particularly shown in the article on "Dysentery," by Dr. Fleyner; on "Endometritis," by Professor Byford; on "Dislocations" and "Fractures," by Professor Stimson and Dr. Keyes, Jr.; on "Gout," by Dr. Levison; on "Hip-Joint Diseases," by Reginald H. Sayre; on "Eczema," by Professor Stelwagon. A specially attractive feature is observed in the analytical study of "Hysteria" and "Hypnotism," by Professor Eskridge. The same favorable comments accorded the previous volumes in this JOURNAL may be accorded Volume III. The work is in line with the advances of the times, and represents the results of experiences and thoughts of master minds. It is full of practical information and very suggestive material.

THE NEWER REMEDIES.—By Virgil Coblentz. Third edition. Revised and very much enlarged. Philadelphia: P. Blakiston's Son & Co., 1012 Walnut Street. 1899. Price, \$1.

This volume contains considerable information that is desired by the pharmacist and physician upon the newer remedies. The articles are all arranged alphabetically, and include information concerning their synonyms, sources, methods of preparation, tests, solubilities, incompatibles, medicinal properties and doses as far as known. There are also sections on organo-therapeutic agents and indifferent compounds of iron.

Professor Coblentz was wise in making a special study of the newer remedies some years ago, and has followed the subject very thoroughly ever since. Up to 1896 there were about 800 synthetic medicaments in all. During the last three years alone there have been added about 1,200 more, so that the future of this subject is beyond all conjecture. The difficulty for the pharmacist and the physician is to secure reliable information concerning the newer products. Professor Coblentz has sifted the literature very well, and we have here a work which may be considered to be as safe and reliable as it is possible for a work of this character to be at the present time.

MERCK'S 1899 MANUAL OF THE MATERIA MEDICA.—Together with a Summary of Therapeutic Indications and a Classification of Medicaments. A Ready Reference Pocket Book for the Practising Physician. Compiled from the most Recent Authoritative Sources, and published by Merck & Co., New York.

The work is intended to be a "Ready Reference Book" on the chemicals and drugs usually employed in modern medical practice. Part I contains information upon the common synonyms, physical properties, solubilities, percentage strengths, physiological effects, therapeutic uses, modes of administration and application, regular and maximum dosage, incompatibles, antidotes, precautionary requirements of all the substances and preparations which are treated in the work. Part II contains a summary of therapeutic indications for the employment of remedies, arranged according to the pathologic conditions to be

combated. Part III presents a classification of medicaments in accordance with their physiologic actions.

The work has been carefully prepared, and contains just the kind of information that the physician is constantly requiring in his practice. It is a book, too, that the pharmacist can very profitably employ. The form and size of the book are such that it can be easily carried in the coat pocket and used by the physician, pharmacist or student in "brushing" up his memory whenever opportunity presents.

PRACTICAL MATERIA MEDICA FOR NURSES and an appendix containing poisons and their antidotes, with poison emergencies, mineral waters, weights and measures, dose list and a glossary of the terms used in materia medica and therapeutics. By Emily A. M. Stoney. Philadelphia: W. B. Saunders, 925 Walnut Street. 1899.

This work consists of the notes of a series of lectures delivered by the author, and includes only the source of the drugs, their action and uses, dosage and the symptoms and treatment of poisoning. It seems a pity that when there are so many books of a practical character the author should have spent her time in preparing this work which contains nothing that is new, and it can hardly be said that it either reflects or is intended to encourage the desire for accurate knowledge. Neither is there an attempt to follow a system or even stick to the plan of the book. We presume that what the author meant by source of drug is the origin as given in the Pharmacopœia. In some cases this is partly done, as under "Stramonium Leaves" and "Stramonium Seed." Under "Conium" the author says "the leaves and fruit of 'Conium Maculatum' is an antispasmodic and calmative." Then follow the doses of the extract and fluid extract of Conium. Under "Lemon Peel" all that is said is that "it is used for flavoring purposes." Then in the same sentence comes "Action and Uses.—Internally, lemon juice is a refrigerant and forms a refrigerant drink," etc. Instances of this character are common throughout the book. The definition of Materia Medica in the "Introductory" is very different from that given in the "glossary." The origin of Kola is given as "Sterarbia Acuminata." Under "Taka-Diastase" the following information is given: "A ferment produced by the action of Japanese rice-fungus; used as a disinfectant." "Cetrarin" is defined as "an alkaloid from Iceland Moss." These instances are sufficient to justify what was said in the first part of this review.

PRACTICAL METHODS OF URINE ANALYSIS.—For chemists and druggists, with notes on the composition of the normal and abnormal renal secretions. Published at the offices of *The Chemist and Druggist*, 42 Cannon Street, London, E. C.

That there is a growing importance to the physician and patient that the urine of the latter be analyzed is observed in the numerous works on urine analysis being published and the extent to which, in some of our text-books, a chapter on urine analysis is added. That the analysis of urine, from both a chemical and microscopical standpoint, is a legitimate field for the pharmacist is evidenced by the demand for instruction in this particular field. The book before us is a fairly accurate, clear, simple and practical treatise on this subject. With the exception of those portions treating of the spectroscope and polari-

scope, it may be said to be useful for the beginner who has no opportunity for instruction. We consider it, however, far more desirable for the analyst, if at all possible, to obtain a course of instruction under a competent instructor and make for himself a series of type slides of urinary sediments, etc.

AMERICAN PHARMACEUTICAL ASSOCIATION.

The following circular has been issued by the Section on Scientific Papers of the American Pharmaceutical Association :

Members of the American Pharmaceutical Association are cordially invited to present communications at the meetings of this Section to be held at Put-in-Bay, September 4th to 18th next. The attention of contributors is respectfully directed to the resolution adopted at the last meeting, to the effect that the official printer is requested to return to the author any paper or papers not bearing the approval of the Chairman of some Section of the Association.

The printing of papers previous to their reading is optional with the authors, but no paper can be received for this purpose later than August 8th.

Attention is also called to the resolution of 1895 (Proc., xliii, 236) requiring that any paper, the reading of which would require fifteen minutes or more, be read in abstract.

The list of queries here proposed is but brief, as it appears that contributors usually prefer to select their own subjects. Papers may be sent to any member of the Committee :

H. H. Rusby, *Chairman*, 115 West Sixty-eighth Street, New York.

H. V. Army, *Secretary*, 107 Streater Avenue, Cleveland, O.

W. L. Scoville, St. Botolph and Garrison Streets, Boston, Mass.

(1) Is it practicable to provide an illustrated set of color-standards in the U.S.P.?

(2) Is it practicable to provide a set of odor-standards in the U.S.P.?

(3) Methyl alcohol corresponds very closely to ethyl alcohol as a menstruum for drugs; what objections can be made to its employment in making solid extracts?

(4) Glycerin aids materially in preserving hydrocyanic acid and spirit of nitrous ether; is its use desirable from a dosimetric and therapeutic point of view?

(5) Is it proper to make belladonna preparations from *Scopola* in the face of the present U.S.P. definition? Should the U.S.P. change its definition so as to sanction the use of this rhizome as an alternative?

(6) Is physiological action requisite as a department of pharmaceutical research?

(7) What is the effect of the high price of ipecac upon the quality of ipecac preparations supplied?

(8) Many imported drugs, such as opium, lactucarium and saffron, could be cultivated in the United States were the question of wages eliminated. An investigation into the feasibility of such culture on the convict farms of several States of the Union is desired.

(9) To what extent are medicinal plants cultivated in the United States?

(10) How can *Syrupus* U.S.P. be best obtained of a uniform quality and density without undue cost?

(11) Potassium and sodium acetates frequently contain a large amount of free acid. Samples containing more than 10 per cent. of free acid have been obtained. What is the reason of this?

(12) Recent research seems to show that the coloration of syrup of ferrous iodide and syrup of hydriodic acid is not due to the separation of free iodine. Further work on this subject is desired.

(13) Is the U.S.P. 1890 process of preparing syrup of ferrous iodide as satisfactory as the process of 1880? A critical comparison is invited.

(14) A report on the quality of commercial syrup of ferrous iodide, with special reference to preservatives employed, is desired.

(15) What is the quality of calcium hypophosphite found in commerce? What influence has this on syrup of hypophosphites prepared therefrom?

(16) Is "old cascara" any better than "new cascara" for preparing a bitterless extract? A good formula for the latter is desired.

(17) Have ambergris and civet been relegated to the past in perfumery? There is evidence that they are not being used in the later extracts.

OHIO STATE PHARMACEUTICAL ASSOCIATION.

The Association met in annual session June 22d, 23d and 24th, at Put-in-Bay.

The meeting was well attended and appears to have been a profitable gathering.

The President, J. H. Beal, made a number of recommendations in his annual address which were finally adopted by the Association. The most important of these recommendations were as follows: That the Association amalgamate with the National Association of Retail Druggists as a body; that the Association use its efforts to further the work of the Pure Food and Drug Congress to formulate and have passed uniform pure food and drug laws of such a character as will be consistent with the interests of retail druggists; that young men who desire to register as pharmacists shall be graduates of some reputable school of pharmacy; that each member of the Association procure a poison register, and register therein all sales of poisons; and that a committee be appointed to prepare resolutions to be sent to their Senators and representatives requesting them to secure a more equal distribution of the war tax, extending it to trade-mark and copyright goods.

A paper, on the "Registration of Poisons," was read by Theo. D. Wetterstroem, of Cincinnati; Prof. H. V. Army, of Cleveland, gave a talk and demonstration on the manufacture of emulsions; and Prof. Joseph Feil, also of Cleveland, read a paper on the manufacture of spirit of nitrous ether.

The use of salicylic acid having been referred to in the report of the Committee on Adulteration and Sophistication by Prof. G. B. Kauffman, of Columbus, the Association adopted a resolution which was to the effect that, salicylic acid having been proved to be a valuable anti-ferment and harmless in minute quantities, it was the sense of the Association that the use of this preservative in reasonable quantities was not objectionable; and that the Legislative Committee of the Association be requested to exert their influence in securing more reasonable legislation in this direction.

The names of thirty-four applicants for membership in the Association were reported by the Executive Committee.

The following officers were elected for the ensuing year :

President, Alfred De Lang, Cincinnati ; First Vice-President, Adam Schmidt, Springfield ; Second Vice-President, H. F. Vortkamp, Lima ; Permanent Secretary, L. C. Hopp, Cleveland ; Permanent Treasurer, John H. Von Stein, Upper Sandusky ; Executive Committee, John Byrne, Columbus, Chairman ; A. Hare, Belleville, and J. C. Firmin, Findlay.

Hotel Victory, Put-in-Bay, O., was selected as the meeting place for 1900.

MINNESOTA STATE PHARMACEUTICAL ASSOCIATION.

The Association held its fifteenth annual meeting at the pavilion of the Lake Park Hotel, Lake Minnetonka, June 20 to 22, 1899.

The attendance, though smaller than in previous years, was good, and the meeting was marked by earnestness and enthusiasm.

In line with President Heller's suggestion, the Association voted that the war tax ought to be reduced to 1 per cent., and that it should be extended to all proprietary articles. Copies of the resolution are to be sent to Congress and to the National Association of Retail Druggists. The question of joining the N. A. R. D. was then discussed, and it was decided that the Minnesota Association should become a member of the National body. The incoming President was instructed to name a committee, consisting of one man from each judicial district through the State, which shall consider district societies and report to the next convention. It was decided to send one delegate to Washington to assist in the revision of the Pharmacopœia, and to elect five men, whose names shall be submitted to the Governor for appointment to the Board of Pharmacy.

D. R. Noyes, of St. Paul, made a brief address, in which he took a very optimistic view of present trade conditions. He thought department store competition would decrease as times grew better, and urged the necessity of putting the very best appearance possible on business and of keeping well up to date.

A very interesting talk on "Practical Hints in Pharmacy" was given by Thomas Voegeli, of Minneapolis. He contended that substitution was nothing but honest business competition so long as you frankly sell an article of your own in place of the patent medicine and do not attempt to imitate it.

J. C. Eliel, of the Wholesale Druggists' Association, also discussed substitution, claiming that the business was his who got it, providing that he got it honestly. He endeavored to demonstrate to the convention that if each druggist would buy the raw drugs and manufacture his own compounds, that the golden days of pharmacy would come again. Then the fight between the proprietary men and the retailers would cease, as there would no longer be any demand for patent medicines.

The elections resulted as follows : President, John Nielson ; First Vice-President, B. O. Kyseth ; Second Vice-President, Miss E. Williams ; Third Vice-President, C. A. Jack ; Secretary, E. B. Wilson ; Treasurer, H. W. Rietzke (unanimously) ; Executive Committee, Messrs. Danek, Harrah and Hall.

Votes of thanks were extended to Senator Gausewitz and Messrs. Kelly, Nelson, Omlum, Johnson and McCollom for their services in the matter of the amendment to the pharmacy law.

OBITUARY.

JAMES M. FARR, manager of the New York branch of the well-known chemical manufacturing firm of Powers & Weightman, died at his home, on Lexington Avenue, in that city, on June 24th, after an illness of about three months.

The deceased was sixty-seven years of age, having been born in Philadelphia in 1832. He was the son of John Farr, one of the founders of the above-mentioned firm, and who was identified with the early manufacture of quinine products in this country, having as long ago as 1826 contributed an article to this JOURNAL, the title of which was "On the Extract of Quinine." It was therefore but natural that the son should take an interest in this branch of manufacture, he having aided very materially in the progress made in a commercial way.

As a young man Mr. Farr entered the employ of Powers & Weightman in this city, going to New York in 1865. He was associated with the firm during the remainder of his business career, with the exception of two years spent in Europe, whither he went in 1869.

Mr. Farr is survived by a widow and three sons.

He was highly esteemed by those who knew him, and has been spoken of as "amiable and gentle, courteous and considerate, upright and honorable."

PROFESSOR JEAN-FELIX JEANJEAN, the Director of the School of Pharmacy of Montpellier (France), died on the 17th of May, after an illness of some months' duration.

Professor Jeanjean was born in Montpellier on January 21, 1829, and had therefore attained the age ordinarily allotted to man. His education, which was classical in character, was obtained in the schools of his native city. Having early evinced a faculty for scientific study, in 1852 he was chosen an assistant in mathematics in the University of Montpellier. In 1853 he was promoted to the assistant professorship in the physical sciences, and in 1859 took charge of the course in physics. Meanwhile, through the advice of his uncle, the eminent chemist Balard, he took a course in pharmacy, graduating in 1857. After several promotions, he became professor of organic chemistry at the School of Pharmacy in 1868, and in 1894, in recognition of his long services, was chosen Director of that institution.

Professor Jeanjean made several noteworthy investigations in organic chemistry, and his toxicological researches brought him into prominence as an expert in questions of jurisprudence.

He was connected with the universities of Montpellier for forty-seven years, and well deserved the distinguished honors of which he was the recipient. In 1870 he was made an officer of the Academy, in 1878, officer of public instruction, and on June 10, 1896, was made a knight of the Legion of Honor, this being the occasion of the unveiling of the bust of his uncle Balard in the courtyard of the School of Pharmacy.

THE AMERICAN JOURNAL OF PHARMACY

SEPTEMBER, 1899.

WOOD-TAR CREOSOTE.

BY LYMAN F. KEBLER.

Research Committee E, Pharmacopœia Revision.

Creosote is a complex mixture of phenoloid compounds, the proportions of which are materially influenced by the kind of wood employed for distillation, the methods resorted to for purifying and removing the creosote from the distillate and the amount of certain constituents removed from the creosote proper, by fractional distillation.

The above mixture of compounds consists chiefly of several homologous series, prominent among which are the acid methylic esters of catechol, but any of the compounds contained in the following table may be met with.

Names. ¹	Formula.	Boiling-Point.
MONOHYDRIC PHENOLS.		
Phenol, carbolic acid,	C_6H_5OH	182° C.
Paracreosol, cresylic acid,	$C_6H_4(CH_3)OH$	203° C.
Xylol, or phloral,	$C_6H_3(CH_3)_2OH$	220° C.
METHYL ESTERS OF DIHYDRIC PHENOLS.		
Guaiacol or methyl catecholate,	$C_6H_4 \left\{ \begin{smallmatrix} OCH_3 \\ OH \end{smallmatrix} \right\}$	200° C.
Creosol or methyl methyl-catecholate,	$C_6H_3(CH_3) \left\{ \begin{smallmatrix} OCH_3 \\ OH \end{smallmatrix} \right\}$	219° C.
Homocreosol, or dimethyl-guaiacol,	$C_6H_2(CH_3)_2 \left\{ \begin{smallmatrix} OCH_3 \\ OH \end{smallmatrix} \right\}$	230° C.
Cœrulignol, or propyl-guaiacol,	$C_6H_3(C_3H_7) \left\{ \begin{smallmatrix} OCH_3 \\ OH \end{smallmatrix} \right\}$	241° C.

Creosote is generally supposed to consist, for the greater part, of

¹ After Thorpe, *Dict. of Applied Chemistry*, Vol. I, 614.

guaiacol and creosol, the former predominating in one case and the latter in another. This idea has become so prevalent among some, that they thought guaiacol to the extent of sixty or more per cent. could easily be obtained by fractionating a good quality of creosote. Such may have been the quality of creosote years ago, but things have changed. It is claimed that when a demand arose for guaiacol and its salts, the proportion of this valuable compound began gradually to diminish, until to-day it has become difficult to purchase creosote containing 20 per cent., and an article containing 60 per cent. is a curiosity. The above demand may have had an influence, but the writer is inclined to look at it somewhat differently. The high percentage of guaiacol reported by some workers was probably due to faulty methods of analysis.

A. Béhal¹ and E. Choay, on fractionating genuine beechwood creosote and analyzing those portions coming over between 200° and 210° C., and 200° and 220° C., found them to have the following composition :

	Boiling-Points, 200-210° C. Per Cent.	Boiling-Points, 200-220° C. Per Cent.
Monophenols	39'00	39'00
Guaiacol	26'48	10'72
Creosol and homologues	32'14	39'98
Loss	2'38	1'30

The above analyses indicate that a specimen of creosote containing 25 per cent. of guaiacol is a fairly good one. Other recent analyses contribute towards this view. But it must be remembered that, while the larger proportion of the guaiacol distils between the above temperatures, not all comes over. This is well shown by the results of the present investigation. Those samples beginning to boil at about 210° C. (corrected) contain the largest amount of guaiacol. The probable reason for finding the guaiacol in higher fractions is that we find it almost impossible to closely separate by fractionation the various components of complex mixtures, like creosote. It has been found that a fraction of creosote coming over between 200° and 210° C. may contain a goodly per cent. of phenol having a boiling-point 20° below the lowest boiling-point. And the same fraction has been found to contain more than one-third its weight of creosol, a body having a boiling-point of 219° C.

¹ 1894, *Comb. rend.*, 119, 166.

It is sometimes very difficult to differentiate between the various creosotes. Especially is this the case when slight admixtures are dealt with. Qualitatively, beech and oak creosotes are alike. This is probably true of other creosotes. E. Hirschsohn¹ has compared beechwood tar with the tars of birch, fir and juniper. Apparently he has established identity tests for the several products when unmixed. But it is the writer's experience that when mixtures of the above substances are met with, many uncertainties present themselves.

Distinctive tests for creosote itself are found in books, but they are of little service in practice, where positive results only can be relied on. For example, carbolic acid, cresylic acid and creosote can readily be distinguished from one another, but it is quite a different thing if mixtures of these substances have to be dealt with. The simultaneous presence of these substances seriously modifies the identity tests.

Oak wood creosote is much more caustic than beechwood. This is due to the fact that the former contains a larger proportion of the monophenols and a correspondingly smaller amount of guaiacol than the latter. Both contain about the same amount of creosol and its homologues. Pine wood creosote distilling between 200° and 220° C. was found² to contain 40 per cent. of monophenols, 20.3 per cent. of guaiacol and 37.5 per cent. of creosol and its homologues.

There is also some difference in the specific gravities of the various creosotes. The U.S.P. requires a specific gravity not lower than 1.070 at 15° C., while the B.P. is more rigid, in that the lowest limit cannot be below 1.079 at 15° C. The former can easily be met with by a creosote that does not contain any guaiacol. It seems desirable to make this requirement slightly more rigid.

From the above statements, it can readily be seen that the analyst is liable to be confronted with considerable vagueness when he attempts to identify the various creosotes and mixtures of the same. But be this as it may, we are, nevertheless, able to get at the quality of a creosote very closely by careful examination, as the data in the table below will show.

¹ 1898, *Pharm. Ztg. f. Russl.*, 35, 801.

² 1894, *Comp. rend.*, 119, 1276.

No.	Specific Gravity.	Boiling-Point, Celcius.	Per Cent. of Substance Distilled Between the Following Temperatures, C.° Corrected.					
			7-200°	200-205°	205-210°	210-215°	215-220°	220-238°
1	1'0748	195-224	5	34	26	23	6	3
2	1'0748	195-222	20	20	30	19	7	1
3	1'0630	210-238	00	00	00	30	25	40
4	1'0642	208-238	00	00	2	37	21	36
5	1'049	188-220	18	12	12	39	14	—
6	1'069	200-225	32	18	10	24	9	4

No.	Color.	Reaction.	No of C.c. of 7'5 Per Cent. NaOH Solution Required to Dissolve 2 C.c. of Creosote.	The Glycerin-Water Test.	20 C.c. of Alcoholic Potash Mixed with 1 C.c. of Creosote.
1 . .	Nearly colorless	Faintly acid	9	Normal	{ Crystals in 15 minutes. Solid in 40 minutes.
2 . .	Nearly colorless	Faintly acid	8	"	{ No crystals in 5 hours. Solid in 18 hours.
3 . .	Amber	Faintly acid	9	Emulsion	{ Crystals in 4 minutes. Solid in 15 minutes.
4 . .	Straw color	Neutral	7	"	Solidified almost immediately.
5 . .	Nearly colorless	"	8	"	Solidified on cooling.
6 . .	Nearly colorless	Faintly acid	8	Normal	" "

No.	Per Cent. of Guaiacol.	Per Cent. of Potassium Guaiacol and Creosol.
1	None	60
2	"	48
3	8	60
4	16	106

The six samples were obtained directly, as far as could be ascertained, from as many manufacturers. The boiling-points, as well as other tests, show that all of the samples fail to comply with the U.S.P. requirements. There was a slight residue in every case on distillation. The alcoholic potash-creosote mixture proved the most interesting. With Nos. 1, 2, 3 and 4 the mixture was made at the ordinary temperature, and the last two according to the directions of the Pharmacopœia.

The guaiacol was estimated by the following process: Mix 5 c.c. of creosote with 50 c.c. of a 20 per cent. alcoholic solution of potassium hydrate; in from 10 to 30 minutes a crystalline mass will result, due to the combination of guaiacol and creosol with the potassium. Press crystalline mass between filter paper until dry, place into a test-tube, add 5 c.c. of 10 per cent. sulphuric acid, heat mixture a moment and the guaiacol and creosol will rise to the surface of the liquid. Dilute sufficiently with water so that the oily portion will sink to the bottom, decant aqueous portion and add 4 c.c. of concentrated ammonia water. A hard crystalline compound is immediately formed with the guaiacol, and after some time a semi-crystalline mass results with the creosol. On treating the above crystalline mixture with benzin, all but the ammonium compound of guaiacol is dissolved, and separation can be effected by decantation and washing or filtration and washing. Acidulate the solid residue with 10 per cent. sulphuric, extract the guaiacol by means of benzin and evaporate in a tared vessel.

To differentiate between creosote and phenols, thoroughly agitate one volume of the creosote with diluted glycerin (3 of glycerin to 1 of water), then set aside for separation. The diminution in the volume of creosote indicates roughly the amount of soluble impurities.

The barium hydroxide test for cœrulignol and other high-boiling constituents was also applied, but their presence was not revealed in any case.

The *collodion test*, the *ferric chloride test* and the *bromine test* did not give results on which any reliance could be placed.

In the writer's experience the pharmacopœial requirements should be based on the following points: physical appearance, reaction, solubility, specific gravity (not below 1.080 at 15° C.), boiling-point (200 to 220° C.), reaction with a 20 per cent. absolute alcoholic potassium hydrate solution, and a test for neutral oils, although this is indicated by the boiling-point.

NEW ALKALOID IN STAVESACRE. F. B. Ahrens (*Ber. d. D. Chem. Ges.*, 1896, p. 1581) has discovered a new alkaloid in *Delphinium Staphisagria*, which he has called *Staphisagroin*, the formula of which is $C_{20}H_{24}NO_4$, and it does not give any of the color reactions of the Delphinium alkaloids.

ALKALOIDS OF ANHALONIUM LEWINII. E. Kander (*Archiv. d. Pharm.*, 1899, p. 3) finds, beside *Mescaline*, *Anhalonidine* and *Lophophorin*, two other bases, viz., *Pellotine* and *Anhalomin*.

HYDROGEN PEROXIDE AS A TEST FOR SALICYLIC ACID.

BY W. E. RIDENOUR.

The writer, having had a quantity of sodium salicylate which was not of the required whiteness, attempted to bleach the same by the use of hydrogen peroxide, whereupon the sodium salt developed a beautiful cherry red color. The thought then suggested itself that hydrogen peroxide might be used as a test for salicylic acid, and a series of experiments were performed for determining its availability in this respect.

The United States Pharmacopœia gives the following characters and tests of identity for salicylic acid: Physical appearance; solubility in different solvents; melting-point; reaction with ferric chloride, and odor in the presence of sulphuric acid and methyl alcohol upon heating. In addition to these, the British Pharmacopœia gives the uranium nitrate test. In Prescott's "Organic Analysis" we also find the following: Reactions with bromine water, nitric acid, copper sulphate, glucose, sodium amalgam, and lime.

Before giving the results of his experiments the author wishes to state that the value of hydrogen peroxide as a test for salicylic acid depends upon the presence of an ammoniacal solution of ammonium carbonate, the U.S.P. solution having been found best adapted for the purpose; also that the solution of hydrogen peroxide used contained 2.301 volumes of available oxygen. The solution of sodium salicylate designated in the first column of the following statements was a 10 per cent. solution.

	Sodium Salicylate Solution, C.c. Taken.	Water Sufficient to Make 100 C.c.	Hydrogen Peroxide Solution, C.c. Taken.	Ammonium Carbonate Solution, C.c. Taken.	Color Reaction.
1 . . .	100	—	15	5	Dark garnet.
2 . . .	20	80	15	5	Amber.
3 . . .	1	99	15	5	Cherry red.
4 . . .	.5	99.5	15	5	Light pink or peach.

It will be found, upon calculation, that in experiment No. 4 the proportion of salicylic acid is 1 in 2,083 parts of water, and this was the weakest solution which gave the reaction.

It was found that, in using solutions of hydrogen peroxide of

greater strength than stated above, the color was at first developed, but rapidly disappeared.

Sodium Salicylate Solution, C.c. Taken.	Water Sufficient to Make 100 C.c.	Chemicals Present.	Quantity of Chemical Taken.	Hydrogen Peroxide Solution, C.c. Taken.	Ammonium Carbonate Solution, C.c. Taken.	Color Reaction.
I	99	Ammonium oxalate.	500 gm.	15	5	None.
I	99	Potassium nitrate.	"	15	5	Cherry.
I	99	Ammonium chloride.	"	15	5	"
I	99	Sodium benzoate.	"	15	5	"
I	99	Sodium and potassium tartrate.	"	15	5	Dark cherry.
I	99	Sodium phosphate.	"	15	5	Cherry.
I	99	Acid ammonium fluoride.	"	15	5	None.
I	99	Sodium borate.	"	15	5	Amber.
I	99	Sodium hyposulphite.	"	15	5	Light lemon.
I	99	Ammonium sulphate.	"	15	5	Cherry.
I	99	Gallic acid.	"	15	5	Lemon.
I	99	Sodium acetate.	"	15	5	Cherry.
I	99	Sodium sulphite (D. & P.).	"	15	5	None.
I	99	Potassium citrate.	"	15	5	"
I	99	Potassium chlorate.	"	15	5	Cherry.
I	99	Sodium hypophosphite.	"	15	5	"
I	99	Lactic acid, 75 per cent.	"	15	5	"
I	99	Tannin.	"	15	5	Yellow.
I	99	Potassium iodide.	"	15	5	Amethyst.
I	99	Potassium bromide.	"	15	5	Cherry.
I	99	Alcohol.	15 c.c.	15	5	"
I	99	Glycerine.	"	15	5	Deep peach.
30	—	Ammonium oxalate.	500 gm.	15	5	Light amber.
30	—	Acid ammonium fluoride.	"	15	5	Garnet.
30	—	Sodium hyposulphite (D. & P.).	"	15	5	Lemon.
30	—	Sodium sulphite (D. & P.).	"	15	5	No color.
30	—	Potassium citrate.	"	15	5	Dark red.
I	99	Sodium sulphocarbonate.	"	15	5	Cherry.
I	99	Carbolic acid.	"	15	5	"
—	100	Sodium salicylate (natural).	100 gm.	15	5	"

Replacing the solution of ammonium carbonate (U.S.P.) in experiment No. 3 (Table 1), by an equivalent quantity of 20 per cent. solutions of caustic soda, sodium carbonate (crystals), caustic potash, potassium carbonate and ammonia, no color reaction was observed. However, a simple solution of ammonium carbonate gave a light pink color, whereas an ammoniacal solution of ammonium carbonate as in experiment No. 3 gave a cherry red.

To show the influence of other chemicals on this test, the preceding table (No. 2) is presented.

It should be noted that in the above table (No. 2) where no reaction was obtained with the weaker solution of sodium salicylate, in most cases a reaction was obtained with a stronger solution.

It may furthermore be stated that none of the above chemicals alone gave a color reaction with hydrogen peroxide and ammonium carbonate, except gallic and tannic acids.

ODOR AS AN AID TO THE RECOGNITION OF DRUGS.

BY CLEMENT B. LOWE.

In considering the recognition of odors, we find that the sense of smell reaches its highest development in the mammalia, and that among many animals the olfactory nerves are exceedingly well developed. We are all acquainted with the fact that the fox hound will follow his prey at a rapid pace, being guided solely by the sense of smell; the bloodhound will also track a criminal along a travelled highway with unerring certainty, if first allowed to smell some of the criminal's garments; and that certain of the ruminants, as the antelope of the Western plains, escape from their enemies by means of this marvellously developed faculty. It is probable that the lower animals have the memory of smells unusually developed, that they thus receive impressions upon their mental consciousness which they could not obtain in any other way; for example, a dog, in making the acquaintance of a stranger, or in recognizing some one long absent, will frequently supplement the impressions received through eye and ear by those received through smell, before he becomes entirely friendly.

The sense of smell is very acute in some of the lower races of mankind, being far better developed than in civilized man. Humboldt states that "the Peruvian Indians can detect the approach of a

stranger, in a dark night, by the sense of smell, and can tell whether he is a white man, an Indian or a negro." The Arabs are said to smell a fire thirty miles off. There is an interesting case on record of a lad by the name of James Mitchell, who was born blind, dumb and deaf, who chiefly depended on smell for keeping up a connection with the outer world.

Amongst refined society, however, the word smell is almost tabooed. Dr. A. L. Benedict quotes Professor Woods Hutchinson as saying the present method of training children is such as to repress the intellectual use of the sense of smell. To smell food subjects the child to dismissal from the table; to ask, "What smells?" is considered vulgar; to say "Who smells?" is treated as an indecency. In fact, in our endeavor to be "nice," we even confuse the word "smell" with the always intransitive verbs "reek" and "stink," as is well illustrated by an anecdote of the lexicographer, Johnson. A lady, in remonstrating with him for his well-known carelessness in matters of toilet, said: "Positively, doctor, you smell." "You are wrong, madam," replied the doctor, "you smell, but I stink." Instead of blunting this sense, it should be cultivated and rendered more acute, as by means of it we are able to recognize the presence of deleterious gases and organic impurities in the air more quickly than by any scientific method. We are aided to a considerable extent in the selection of our food by the sense of smell; no one would think of eating any food having a rank or putrid odor; on the other hand, food having a pleasant odor, by reflex action, excites the flow of saliva (we say, makes the mouth water), and thus aids digestion. Odor may be considered one of the ways by which nature frequently gives warning of the poisonous character of plants, as in the case of *cannabis indica*, opium, tobacco, etc. The sense of smell is also an aid in differentiating many plants and drugs from one another, and what is almost of equal value, it enables us to judge to a considerable extent of their freshness. For example, the herb tansy, as frequently seen in the market, is much broken, so that its identity can only be determined by careful examination; but by rubbing between the hands a little of the drug, it can be recognized instantly, as its odor is more characteristic than either its flowers or incised leaves. Elecampane is also a drug with so characteristic an odor that the smallest piece of it can always be distinguished in this way. An odor makes the most acute impres-

sion at the first instant of its recognition, afterwards the mucous membrane of the nasal cavities (for a brief space of time) being clogged with the previous emanations, new odorous particles have difficulty in reaching the terminal nerve filaments imbedded in the mucous membrane. There is some little art in treating a drug so that its odor will be brought out most distinctly. If the drug is such that it can be readily powdered, then by rubbing a small portion briskly between the palms of the hands, so as to rupture the oil glands or resin cells, etc., and partly volatilize their contents, then by bringing the closed hands to the nose the odor will be most distinctly perceived. In the case of a hard drug, a little powder can be scraped off with a knife and treated in this manner.

Thinking that it might be of some value in the recognition of drugs, or at least give us truer ideas of their odors (as even the Pharmacopœia contains some incorrect statements concerning them), I have endeavored to work out a classification of drugs based on their odors. There are difficulties in making such a classification, as, on account of the personal element involved, no two investigators will probably agree to all of the conclusions reached; besides, it is exceedingly difficult to describe odors in words. In quite a number of cases a drug will be found to have almost equal affinities for two or more classes.

CLASSIFICATION OF DRUGS BASED ON THEIR ODORS.

DIVISION I. DRUGS HAVING AN AGREEABLE ODOR.

Class A.—Drugs with an Aromatic Odor. (Odors which are spicy or strong, and generally agreeable.)

(1) Those with a Simple Aromatic Odor.

(a) Odor Strong and Characteristic.

Asarum,	Lupulin (strong on keep-	Sage,
Anthemis,	ing),	Tanacetum,
Cascarilla (stronger when	Inula,	Sandal Wood (somewhat
burned),	Marrubium,	musk-like),
Gelsemium,	Matricaria,	Wormwood.
Hops,	Rhubarb (peculiar),	

(b) Odor Less Strong and not Characteristic.

Arnica Flowers,	Calumba,	Melissa (fragrant, lemon-
" Rhizome,	Eupatorium,	like when fresh),
Angustura (musty),	Juniper,	Pilocarpus.

(2) Those with an Aromatic Mint-like Odor. (The mint odor predominating.)

Buchu, Peppermint, Spearmint, Horsemint, Pennyroyal.

(3) Those with an Aromatic Camphoraceous Odor. (The aroma has a suggestion of camphor in it.)

Calamus, Eucalyptus, Rosemary, Santonica, Serpentaria.

(4) Those with an Aromatic Spicy Odor. (The spicy odor predominates.)

Cloves, Ginger, Cubebs, Matico, Pepper, Pimenta.

(5) Those with an Aromatic and Fragrant Odor. (Odors which are strong, spicy and agreeable.)

Anise, }
 Fennel, } Anise
 Illicium, } Group.

Nutmeg, }
 Mace, } Nutmeg
 Cola, } Group.

Coriander,

Caraway,

Cardamom.

(6) Those with a Bitter Almond Odor. (Odor developed by moistening or bruising.)

Bitter Almond,

Cherry Laurel Leaves,

Wild Cherry Bark.

(7) Those with a Honey-like Odor.

Manna, Mel.

(8) Those with a Fenugreek Odor.

Elm Bark,

Fenugreek,

Marshmallow.

Class B.—Drugs with a Fragrant Odor. (Odors which are sweet-smelling and refreshing.)

(1) Those with a Simple Fragrant Odor.

Cinnamon, }
 Canella, } Cinnamon
 Cinnamodendron, } Group.

Bitter Orange Peel, }
 Sweet " " } Citrus
 Lemon " } Family
 Group.

Gaultheria, }
 Sweet Birch, } Wintergreen
 Group.

Sassafras,

Vanilla (peculiar).

(2) Those having an Odor of Flowers.

Orange Flower,

Pale and Red Rose,

Orris Root (violet odor).

(3) Those having an Odor of Tea.

Cusso (fragrant),

Coca (slight),

Digitalis (slight),

Senna Indica, Thea.

(4) Those having an Odor of Chocolate.

Guarana,

Cacao Butter.

(5) Those having a Fruity Odor.

Fig, Persimmon, Raspberry, Raisin, Prune (feeble),
Purging Cassia (Prune-like).

Class C.—Drugs with a Balsamic Odor. (Odors which are aromatic and resinous.)

(1) Those with a Simple Balsamic Odor.

Eriodictyon,

Grindelia,

Myrrh,

Guaiacum Wood (when heated).

(2) Those with a Balsamic and Fragrant Odor. (Odors which are balsamic and agreeable.)

Benzoin,

Storax,

Sweet Gum,

Bals. Tolu (Vanilla-like),

Bals. Peru (also empyreumatic).

(3) Drugs with a Balsamic and Terebinthinate Odor. (Odor increased by heating.)

Burgundy Pitch,

Gum Olibanum,

Rosin (faint),

Canada Pitch,

Mastiche,

Tar (empyreumatic),

Canada Turpentine,

Sandarac,

Thuja,

Turpentine.

Class D.—Drugs with Peculiar Odors.

Camphor (penetrating),

Capsicum,

Senna Alex.,

Cochineal,

Gentian (sweet),

Saffron (peculiar aroma),

Convallaria,

Jalap (smoky, sweetish), Uva Ursi (hay-like),

Coffee (faint in green state), Quercus (tan-like),

Pulsatilla (aromatic and hay-like).

Class E.—Drugs with a Slight Odor.

(1) Those having a Characteristic Odor.

Logwood (faint, agreeable),

Rumex,

Red Saunders.

(2) Those not having a Characteristic Odor.

Aspidium,

Catechu,

Chimaphila, Cypripedium,

Aspidosperma, Caulophyllum,

Cimicifuga, Dulcamara,

Castanea, Cetraria (odor when wet),

Cinchona (somewhat aromatic),

Euonymus, Nutgall (when bruised),

Menispermum,

Frangula (little odor when dry), Juglans,

Sarsaparilla (earthy),

Scutellaria.

DIVISION II. DRUGS WITH DISAGREEABLE ODORS.

Class A.—Drugs with Narcotic Odors. (Odor heavy and somewhat stupefying.)

Belladonna Leaves and Root (slight),	Hyoscyamus (heavy),
Calendula (somewhat heavy),	Lactucarium (somewhat heavy),
Cannabis Indica (heavy),	Lobelia (slight),
Chelidonium (strong when fresh),	Tobacco (heavy, peculiar),
Stramonium Leaves (slight).	

Class B.—Drugs with Alliaceous Odors. (Sulphuretted odors resembling garlic.)

Asafetida, Garlic, Sinapis Alba and Nigra (when moistened).

Class C.—Drugs with Valerianaceous Odors. (Odor produced on keeping, by oxidation of the volatile oil.)

Lupulin (when old), Valerian, Viburnum Prunifolium.

Class D.—Drugs with Animal-like Odors.

Ambergris,	Oxgall,	Pepsin (should be slight),
Cantharides,	Musk,	Sumbul,
Civet,	Pancreatin (faint, peculiar),	
Conium (mouse-like when triturated with potassa).		

Class E.—Drugs having Disagreeable Characteristic Odors.

(1) Odors which are Strong.

Ammoniac,	Copaiba,	Podophyllum,
Aloes,	Ergot,	Senega (strong in fresh root),
Chenopodium,	Galbanum,	Stillingea,
Sabina.		

(2) Odors not Strong.

Apocynum,	Iris,	Strophanthus,
Chondrus (seaweed-like),	Lappa,	Scoparius (when bruised),
Hydrastis,	Scammony (cheese-like),	Sambucus,
Ipecac (nauseous when powdered),	Stramonium Seed (when bruised).	

DRUGS WHICH ARE DESTITUTE OF ODORS.

Acacia (odor sometimes sour),	Physostigma,	Taraxacum,
Aconite,	Cotton Root Bark,	Phytolacca Root and Fruit,
Asclepias,	Granatum,	Pyrethrum,
Bryony,	Hamamelis,	Quassia,
Chirata,	Kamala,	Quillaja,
Castor Oil Beans,	Kino,	Rhamnus Purshiana,
Croton Oil Beans,	Krameria,	Rhus Glabra,
Chrysarobinum,	Leptandra,	Rhus Toxicodendron,
		Viburnum Opulus,

Cocculus Indicus,	Linum,	Rubus,	Xanthoxylum,
Colchicum Root,	Lycopodium,	Sassafras Pith,	
Colchicum Seed,	Mezereum,	Squill,	Tea.
Colocynth,	Nux Vomica,	Sweet Almond,	
Gamboge,	Pareira,	Sinapis Alba and Nigra (when dry),	
Geranium,	Pepo,	Tamarind,	

THE STRUCTURE AND DEVELOPMENT OF INTERNAL PHLOEM IN GELSEMIUM SEMPERVIRENS, AIT.¹

BY CAROLINE B. THOMPSON, B.S.

The following is the result of observations made during the winter of 1897-98, in the Botanical Laboratories of the Biological Department of the University of Pennsylvania. The material used consisted of specimens of varying age, preserved in alcohol, which had been collected by Professor Macfarlane, while on a trip to Wilmington, N. C., and of seedlings grown in the greenhouses of the department from seeds collected by him. An abstract of the observations upon the stem was read at the meeting of the "Society for Plant Morphology and Physiology," held at Ithaca, N. Y., in December, 1897.

GENERAL LITERATURE.

In the early years of the present century much confusion existed in regard to the terms for the softer elements of a vascular bundle. These were variously called bast fibres, bast cells, latticed cells, sieve fibres, etc. Hartig, in 1837, was the first to correctly describe such elements as sieve tubes, and to regard them as the essential constituents of the phloem. Several years later, Hartig's observations were confirmed by von Mohl, Nägeli and Hanstein. The investigation of plants with internal phloem, or phloem on the inner margin of the wood, was begun by Hartig in 1854, and continued by others. The orders Cucurbitaceæ, Asclepiadaceæ and Apocynaceæ were among the first to be studied. In 1875 de Bary originated the term "bi-collateral bundle," a name that has been objected to by many of the later workers. From that time onward the number of investigators and the detail with which the work has been carried out have steadily increased. The most important contributions to the litera-

¹ "Transactions and Proceedings of the Botanical Society of Pennsylvania," Vol. I, No. 1.

ture of this subject have been made by Vesque, Weiss, Russow, Petersen, Van Tieghem, Fischer, Scott, Gérard, Hérail, Lignier, Leonhard and Lamounette.

Various views are held by different writers upon the relation between the internal phloem and the other parts of the bundle. Some believe with de Bary that an actual bicollateral condition exists, and that the internal phloem is as much a part of the bundle as the external, and is of similar origin. Others, notably the French botanists Hérail and Lamounette, believe that the internal phloem is independent of the bundle and of different origin.

The following papers have been specially consulted :

Solereder, H.—“ Ueber den systematischen Werth der Holzstruktur bei den Dicotyledonen,” 1885.

Scott and Brebner.—“ On the Anatomy and Histogeny of *Strychnos*.” *Annals of Bot.*, Vol. III, 1889.

Scott and Brebner.—“ On Internal Phloem in the Root and Stem of Dicotyledons.” *Annals of Bot.*, Vol. V, 1891.

D. H. Scott.—“ On Some Points in the Anatomy of *Ipomœa versicolor*.” *Annals of Bot.*, Vol. V, 1891.

Hérail.—“ Recherches sur l'Anatomie comparée de la Tige des Dicotylédones.” *Ann. des Sc. Nat. Bot.*, Sér. VII, T. II, 1885.

Lamounette.—“ Recherches sur l'origine morphologique du Liber Interne.” *Ann. des Sc. Nat. Bot.*, Sér. VII, T. XI, 1891.

LITERATURE RELATING TO GELSEMIUM.

Gelsemium sempervirens is commonly known in the Southern States as the “ Yellow Jessamine,” and is placed in the order Loganiaceæ by Solereder, Engler and Prantl and Gray ; in the order Apocynaceæ by Baillon, Le Maout and Decaisne.

In the Laboratory Contributions from the Biological Department of the University of Pennsylvania for 1884, J. G. Shoemaker has a few notes on the stem of *Gelsemium*. He remarks the widening of the medullary rays, and “ the tendency of the pith to be penetrated by several plates of large thin-walled cells, which divide the pith more or less perfectly into four portions.”

Professor Rothrock, in February, 1885, made a short verbal communication to the Philadelphia Academy of Natural Sciences concerning this stem. His attention was attracted by the fact that the diameter of the pith is greater in a very young twig than in a stem

four times its size. He notes the presence of the four medullary phloem patches, and their encroachment upon the pith area.

A great deal of work has been done upon *Gelsemium* from a chemical and pharmaceutical standpoint, but its structure and development have not been thoroughly worked out. The root contains an alkaloid gelsemin, which is very poisonous, but is a valuable medicine when taken in proper quantities. The medicinal properties of *Gelsemium* were accidentally discovered about the middle of this century. An interesting account of the discovery and the primitive method of extracting the poisonous principle from the root is given by William Procter, Jr., in the *AMERICAN JOURNAL OF PHARMACY* for 1852.

Other records of the investigations upon the alkaloid gelsemin are to be found in later numbers of this *JOURNAL*, and in the "Proceedings of the American Pharmaceutical Association."

HISTOLOGY OF A ONE-YEAR-OLD STEM.

A transverse section, about 1 millimetre in diameter, of an internode at the close of the first year's growth shows the following structure (*Fig. 1*). Externally are three to four layers of cork, still covered in places by the prominently ridged cuticle; next is the cortex, consisting of a zone of parenchyma four to five cells deep, rich in protoplasm and containing abundant chlorophyl and starch grains. A ring of large sclerotic cells, which appear in longitudinal section as clear refractive fibres of considerable length, lies on the outer margin of the vascular bundle portion of the stem. The bundle cylinder consists first of a zone of external phloem about six cells deep. Most of the cells are still embryonic, with large nuclei and abundant protoplasm, some few have differentiated into sieve tubes. In longitudinal section the sieve plates can be recognized. The septa are large, transversely placed, and bear either four or three sieve plates with numerous perforations. The cambium layer is clearly defined by its regular brick-shaped cells with large nuclei.

The wood is a broad zone, occupying more than a third of the area of the section, and is traversed radially by the oblong, deeply pitted cells of the medullary rays. A longitudinal section through the wood shows numerous spiral tracheæ in the inner or protoxylem region; external to this are both short and long tracheids,

whose walls are thickened and deeply pitted. Large vessels are numerous in the outer portion of the zone.

On the inner side of the wood lie four large rounded patches of internal phloem extending into the pith. These patches are two to three times broader than the external phloem zone, and consist also of sieve tubes and undifferentiated phloem elements. The inner margins of the phloem patches are bounded by a two-celled layer, which may be termed a phloem sheath (*Fig. 1*). This is sharply differentiated alike from the adjoining pith cells and from the phloem. A row of somewhat similar but smaller cells separates

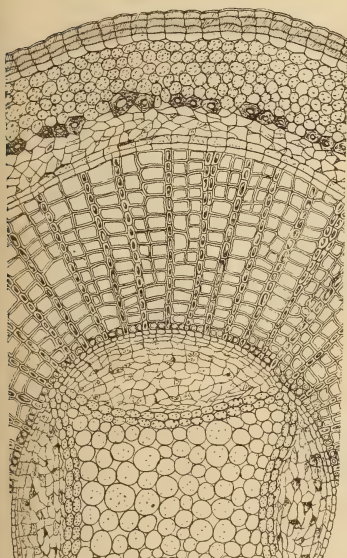


FIG. 1.

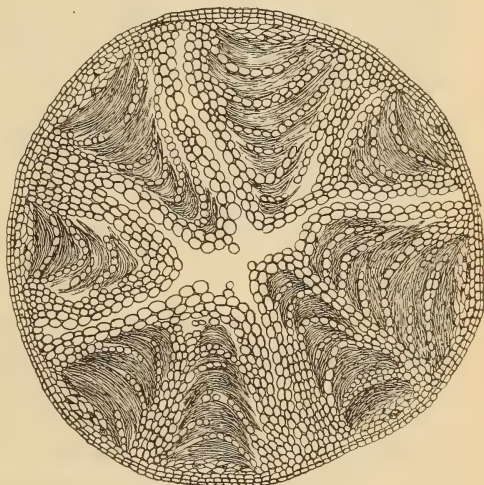


FIG. 2.

the outer margin of the phloem patches from the wood, and immediately internal to this row are the patches of medullary cambium. The cambium cells have the usual brick-like shape, thin walls and large nuclei. The cells of the sheath are rounded and in close contact with each other. They have thickened pitted walls and are conspicuous by their size and the large amount of chlorophyll and starch they contain. The pith cells are much larger, have thin but slightly pitted walls, and a scanty supply of chlorophyll and starch, while the intercellular spaces are larger than those of the phloem sheath. A few short sclerenchymatous or "stone" cells are some-

times present. Very early in the life history of the stem death of the pith cells occurs. The cell contents dry up, the pith as a whole shrinks away from the sides and becomes detached from the phloem sheath, but persists as an inert somewhat lignified mass, until its place is usurped by the enlarging phloem patches.

HISTOLOGY OF THE STEM FROM THE SECOND TO THE TENTH YEAR.

In a transverse section of a stem at the end of the second year's growth, the most prominent change is the increased size of the internal phloem patches. Each has pushed farther out into the pith, and as the growth has been greater in the middle than at the sides, the inner margin has a curved outline, with the convexity toward the pith. The formation of new cells from the medullary cambium takes place centrifugally, the newly formed cells lying external to the old. On the inner side of each patch, adjoining the phloem sheath, a dark crescentic mass of partially obliterated tissue is now evident. This is composed of the older sieve tubes that have collapsed and been pushed together by the pressure from the new elements laid down by the active medullary cambium.

The external phloem has increased but little in breadth, in comparison with the internal patches, but the total number of cells and the actual area of the zone is greater than before. Here and there along the border are darker areas, composed of four or five compressed cells, showing that the same crowding and obliteration goes on, although to a less extent than in the internal patches.

In older stems the increased size of the internal phloem patches becomes more and more prominent. The masses of crushed tissue or "Hornbast" (*Fig. 2*) are more numerous and broader, the later formed ones lying in concentric layers external to the older masses. Some large phloem parenchyma cells are often present between the crushed masses, for they are better able to resist the crushing process, owing to their greater turgidity. The patches may thus present a stratified appearance from the alternation of the bands of crushed tissue and the scattered parenchyma cells. Each of the four patches usually divides into two parts, so that in the oldest stems eight cone-shaped masses of internal phloem are present. The neighboring patches grow together laterally, while they continue to encroach upon the pith. In the oldest stem examined (*Fig. 2*), of about twelve years' growth, the internal phloem patches

entirely fill the former pith area, except a very small space in the centre, where a shrunken thread of dead tissue represents all that remains of the pith. The patches by this time are composed almost wholly of "Hornbast." Only a few sieve tubes are distinguishable, and these are more or less distorted. The contrast between the large cells of the phloem sheath and the dark crushed masses is very striking.

The breadth of the external phloem, which, during the first few years, was less than that of the internal patches, increases greatly in older stems. In a six-year-old stem its breadth almost equals that of the patches; in a ten-year-old stem it exceeds them. The same alternation of bands of "Hornbast" with parenchyma cells occurs as in the internal patches, but as the pressure conditions are different here the bands are narrower and less marked. As the growth has been centripetal, the newly formed tissue lies internal to the old.

The widening of the medullary rays is very noticeable in older stems. The width of a ray at the periphery of the wood is six or eight times greater than at the centre. Elongated cells, that are continuations of the rays, separate the cone-like masses of the external phloem zone.

HISTOLOGY OF A NODAL SECTION.

Near a node the circle of wood and external phloem becomes elliptical, and the patches of internal phloem lie at the ends and sides of the ellipse. The end patches are considerably larger than the side ones and are further divided into a central and lateral portion, the former for the petiole, the latter to remain in the stem. Higher up, the ends of the ellipse curve out more and more, and soon separate from the sides to form the petiolar bundles. Each bundle is accompanied by a portion of the internal phloem, so that at first the petiolar bundle is composed of external phloem, wood and two small masses of internal phloem. Left in the stem are the two long lateral curves of wood and external phloem as before. The two small groups of internal phloem that remained behind at each end now move together to reconstitute the end patches. Above the node the wood reunites into a continuous ring, while at the next node above, the leaf bundles will be given off from the opposite sides of the stem.

The petiolar bundles are at first distinctly bicollateral. Numerous patches of external phloem border upon the outer or lower face of the wood, and on its inner or upper face are two clearly defined patches of internal phloem. Almost immediately after the petiole has separated from the stem, the main petiolar bundle gives off two small lateral branches. These bundles consist chiefly of external phloem with a little xylem. They continue upward through the petiole and along the sides of the leaf, where their branches anastomose with branches from the main leaf bundle. A remarkable change soon takes place in the main petiolar bundle of a kind which, so far as I am aware, has not previously been described. Just above the point where the lateral petiolar bundles branched off, *the two internal phloem patches, one after the other, pass downward and outward through the wood to join the external phloem.* In a transverse section of a petiole, the phloem strands may be seen in longitudinal section passing between the xylem cells. They bend outward along a radius of the bundle, and in a definite position, at about one-half of the distance from the periphery to the mid-line of the bundle. After the passage of these strands, there is no further trace of internal phloem in the petiole or leaf.

HISTOLOGY OF THE ROOT.

The structure of a very young root, in transverse section, is illustrated in *Fig. 3*. The loose-celled starch-bearing cortex, about seven to eight cells deep, is separated by a thin-walled endodermis from the axial vascular cylinder. The bundle is typically diarch. The two groups of the protoxylem consist each of about six spiral tracheæ, and between them at the sides of the bundle lie two small patches of phloem, separated from the protoxylem by the procambium, a layer of large prominently nucleated cells. Outside the xylem and phloem elements, and just within the endodermis, is the pericambial zone. Later, by secondary growth, the xylem is united into a central cylinder, surrounded externally by a ring of phloem, but internal phloem is entirely absent in the root.

On older roots irregular warts or swellings are frequently found, which, when sectioned, reveal a vigorous fungoid growth. The fungoid hyphæ ramify through the cells of the inner and especially the middle cortex, and in some places large cavities occur, resulting from the breaking down of the cortex cells. These are filled with

the coiled hyphæ and the fructifications of the fungus. Starch is usually absent in the cells inhabited by the fungus. In the root of a seedling about six weeks old, the fungus was already well established in many cortex cells.

HISTOLOGY OF THE SEEDLING.

The diarch condition of the root is continued in the hypocotyl, and it may at once be stated that the median plane of the two protoxylem masses corresponds to the median plane of the cotyledons. The spiral tracheæ of each end have at first a Y-shaped arrangement, the arms of the Y pointing toward each other, thus, —<

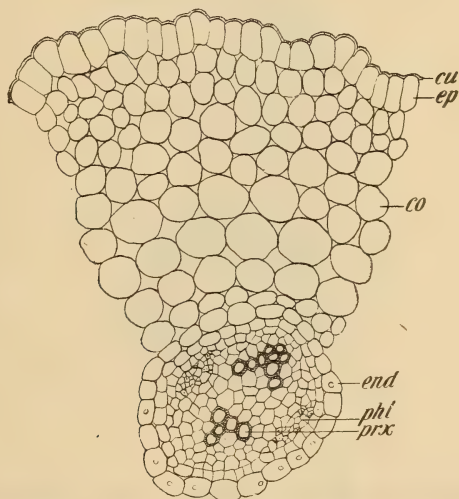


FIG. 3.

>—, but as the hypocotyl increases in age, the cells of the arms move apart, taking a lateral position, with the phloem external to them, usually two patches to each side. This is illustrated in *Fig. 4*.

As differentiation proceeds more spiral tracheæ are interpolated between those already formed, so that a continuous ring of protoxylem is finally present. The phloem consists of small patches of finely divided cells, along the outer margin of the sides of the wood, but is not yet continued around the ends. At the level of the cotyledons, the phloem from the sides bends toward the ends, and the zone is thus completed. No recognizable internal phloem could be distinguished in the young hypocotyl.

In an older hypocotyl, in which secondary growth has gone on for some time, the fundamentals of two internal phloem patches may be observed just below the cotyledonary node. The round hypocotyl becomes elliptical, preparatory to the separation of the cotyledons. Five or six large embryonic cells appear on the inner side of the wood. Their nuclei are large, and take a darker stain than the adjoining cells. In short, the fundament of an internal phloem patch has arisen in the leaf trace bundles, destined for the first, third, fifth and succeeding pairs of leaves. No such fundament is demonstrable in the pair of bundles for the cotyledons, second,

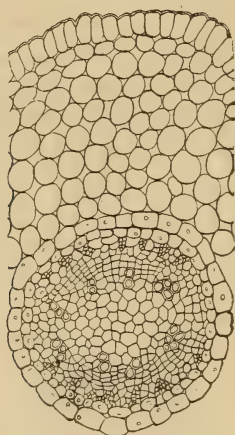


FIG. 4.

fourth and succeeding pairs of leaves. With increased age these embryonic cells become a mass of small, finely divided cells, so that evidently the bundles for the odd pairs of leaves each possess an internal phloem patch. Throughout the lower and middle portions of the epicotyl, or the internode above the cotyledons, the opposite bundles are devoid of internal phloem, but just below the node bearing the first pair of leaves, two groups of embryonic cells appear in them, representing the fundamentals of the internal phloem patches for the even pairs of leaves. When the node bearing the second pair of leaves is reached, all four patches of internal phloem are clearly distinguishable. In the bending out of the leaf bundles into the petioles, the same crossing of the internal phloem to the exterior takes place in the leaves of the seedling that has been de-

scribed above for adult leaves. Scott, in his work upon *Ipomœa versicolor*, found that in the hypocotyl near its junction with the root, the internal phloem passed through the xylem and joined the external phloem. He was thus able to prove the continuity of the phloem throughout the plant. Similar phenomena were observed by Gérard in different plants. There is no trace of any continuity between the external and internal phloem of the hypocotyl of *Gelsemium*. The course of the bundles throughout the hypocotyl and stem is indicated in the diagrammatic figure below (Fig. 5).

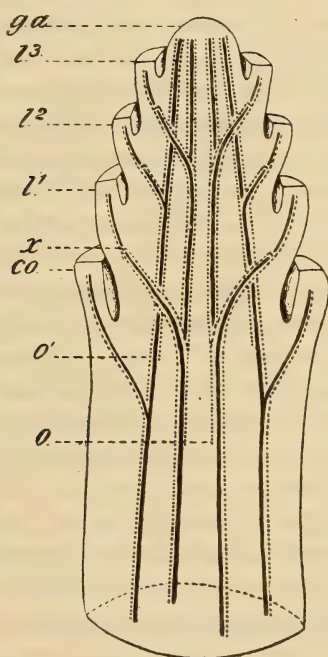


FIG. 5.

o, origin of first pair of internal phloem patches ; *o*¹, origin of second pair ; *co*, cotyledon ; *l*¹, first foliage leaf ; *l*², second foliage leaf ; *l*³, third foliage leaf ; *ga*, growing apex ; *x*, crossing of internal phloem to exterior.

ORIGIN OF THE INTERNAL OR MEDULLARY PHLOEM.

In the growing apex of the stem the first cells to differentiate from the primary meristem are the spiral tracheæ of the protoxylem, which are arranged in radial rows. On their outer border ap-

pear groups of very small, thin-walled cells, whose division walls lie in all planes. Soon thereafter similar groups of small cells are differentiated on the border of the pith area. These represent the internal phloem patches. The course of the internal phloem has been traced in older stems into the petioles, so it may be regarded as an integral part of the leaf trace bundle. It owes its origin to the same primary meristem that gives rise to the external phloem, and the protoxylem. Certain primary meristematic cells on the inner face of the protoxylem represent the medullary cambium. To the later activity of these cells the secondary growth of the medullary phloem is due. A radial arrangement of the later-formed medullary phloem cells is to be observed, and is an indication of their cambial origin. The medullary phloem appears in the hypocotyl some time after the differentiation of protoxylem and external phloem. Its origin, however, is from embryonic cells that are a part of the original primary meristem of the bundle. The appearance of these embryonic cells, on the inner side of two bundles in the hypocotyl, at a definite point below the cotyledonary node, and of similar cells in the two opposite bundles in the epicotyl, just below the first leaf node, may be explained as follows, on phylogenetic grounds. Internal phloem is a secondary character acquired during the evolution of the plant. Since the hypocotyl and cotyledons are embryonic structures representing the primitive stages of growth of the plant, characters that have been acquired by, and are adapted to, the adult stem, may reasonably be found absent throughout the whole, or a part, of the hypocotyl. In this plant the lower portion of the hypocotyl exhibits the ancestral condition in the absence of internal phloem. The upper portion of the hypocotyl and of the epicotyl are transition stages, for two bundles have acquired internal phloem, while two bundles are as yet devoid of it. The region of the first leaf node shows the acquired condition of the presence of internal phloem in all four bundles.

The physiological significance of this acquisition, and the causes that led to it, are not clear. It is a noteworthy fact that internal phloem appears only in parts of this plant where pith is present. Although present in the stem, internal phloem is absent throughout the greater length of the petiole. It is present in the upper portion of the hypocotyl, but is absent in the lower part where the pith area is becoming constricted by inward growth of the xylem. Both in-

ternal phloem and pith are absent in the root. In plants like *Strychnos*, whose roots possess medullary phloem, pith is always present.

The view may be advanced that to utilize the pith area, either for more perfect protection of the phloem, in these twisted and at times contorted stems, or to increase the total amount of it, a portion of the external phloem, during the evolution of the plant, dipped in from the bases of the petioles, through the fissures formed by the leaf traces in the vascular cylinder, and became internal in position. The climbing habit of this plant may be one of the factors in its evolution.

SUMMARY OF RESULTS.

(1) The internal phloem arises primarily as four longitudinal strands, which are an integral part of the leaf trace bundles.

(2) The origin of the internal phloem is simultaneous with, or slightly later than, the protoxylem and external phloem, so that the leaf trace bundles are bicollateral from the first.

(3) The internal phloem patches are bounded internally by a two-celled phloem sheath.

(4) The internal phloem patches grow centrifugally by means of a medullary cambium, the inner and older layers in time becoming crushed and obliterated.

(5) Death of the pith occurs early in the first year.

(6) The continued disintegration of the pith and growth of the internal phloem results in the filling up of the pith cavity with the latter.

(7) The internal phloem, which runs into the petiole, constitutes there at first a bicollateral bundle system, but at the base of the petiole it descends through the xylem as two strands, and from this point upward the primitive collateral bundle system prevails.

(8) No internal phloem is present in the root.

(9) A copious fungoid growth is found in the cortex of the root. Absorption of starch usually results in cells inhabited by the fungus.

(10) No internal phloem is present in the lower portion of the hypocotyl, nor in the cotyledons.

(11) Two of the internal phloem patches of the stem arise just below the cotyledonary node, the other two just below the node bearing the first pair of leaves.

(12) Internal phloem is an acquired characteristic of the plant, and has probably been developed in these long and at times twisted stems, to supplement the external phloem.

RECENT LITERATURE RELATING TO PHARMACY.

A SUBSTITUTE FOR HYDROGEN SULPHIDE IN ANALYSIS.

Any means, whereby the unpleasant, unstable and inconvenient hydrogen sulphide can be replaced in analytical practice attracts the chemist; hence a recent article on the subject by M. Vogtherr (*B. d. Dtsch. Pharm. Ges.*, 1898, 228) is worthy of careful attention.

The writer, after reviewing the various suggested substitutes for hydrogen and ammonium sulphides, concludes that most favorable for this purpose are the sulphur derivatives of carbonic acid, and shows that of these the most acceptable are such as have the sulphur in a thio (SH) group. The best of these, he thinks, is ammonium di thio-carbonate, $\text{CO}(\text{SNH}_4)_2$, which he prepares by mixing five parts of carbon disulphide with nine parts 20 per cent. ammonia in a glass-stoppered bottle and shaking at ordinary temperature as long as carbon disulphide is dissolved, whereupon the excess of ammonia is neutralized with hydrochloric or acetic acid.

The product is an orange-yellow liquid, of scarcely any sulphide odor, containing 10 per cent. to 12 per cent. ammonium di thio-carbonate, 8 per cent. ammonium chloride, and traces of ammonium sulphy-cyanate and ammonium sulphide.

If necessary, a 30 per cent. solution, as stable as ammonium sulphide, can be made. Its only inconvenience is that it stains the skin brown.

The writer gives an elaborate report on the action of the reagent on metals, finding its behavior almost identical with that of hydrogen sulphide.

He then outlines a new table of analysis, covering the minor divergences from hydrogen and ammonium sulphides. Its essential points of difference from the usual methods of analysis (see Sadtler and Trimble, Vol. II) are noted below. In this statement the letter *R* means ammonium dithiocarbonate solution, and the individual identity reactions are omitted.

After precipitation of *Pb.*, *Ag.* and *Hg(ous)* by hydrochloric acid, the scheme continues by precipitating, from the boiled and cold filtrate, the metals *Hg(ic.)*, *Bi.*, *Cd.*, some *Co.*, *As.*, *Cu.*, *Sb.* and *Sn.* by *R* instead of by hydrogen sulphide. This precipitate is warmed with excess of reagent.

A.—Warm *R* does not dissolve *Hg.*, *Br.*, *Pb.*, *Cd.* and some *Co.*

B.—Warm *R* dissolves *As.*, *Cu.*, *Sb.* and *Sn.*

Filtrate from *R* precipitate is boiled with nitric acid and tin-foil (to remove oxalates and phosphates and to oxidize the iron) and is made alkaline with ammonia and boiled.

C.—Precipitate of *Fe.*, *Al.* and *Cr.*

To filtrate from C is added cold *R.*

D.—Precipitate of *Co.*, *Ni.*, *Zn.* and *Mn.*

Filtrate from D handled as usual for separation of alkaline earths (ammonium carbonate, sodium phosphate, etc.).

The separation of *Group A* is as in Sadtler and Trimble, save that *Cd.* and *Co.* remain in last ammonia solution. These metals are separated by neutralizing with hydrochloric acid, adding potassium cyanide and precipitating *Cd.* from this solution by *R.* The *Co.* in filtrate is separated by potassium nitrite.

Group B is separated from its solution in *R* by hydrochloric acid.

(a) Precipitate shaken with ammonium carbonate. *As.* dissolves.

(b) Precipitate treated with cold *R.* *Cu.* dissolves.

(c) Precipitate treated with hot *R.* *Zn.* and *Sb.* dissolves.

These are separated as in Sadtler and Trimble.

Group C is dissolved in hydrochloric acid.

(a) Acid solution treated with potassium hydrate. *Fe.* and *Cr.* precipitated.

Precipitate fused with potassium nitrate and sodium carbonate and treated with water. *Cr.* dissolves; *Fe.* remains.

(b) Filtrate from "a" neutralized with hydrochloric acid and cooked with ammonia. *Al.* precipitated.

Group D is warmed with 5 per cent. hydrochloric acid.

(a) Residue *Co.* and *Ni.*

Separated as in Sadtler and Trimble, or with potassium nitrite.

(b) Acid solution treated with potassium hydrate. *Mn.* precipitated.

(c) Filtrate from "b" treated with *R.* *Zn.* precipitated.

H. V. ARNY.

CONSTITUENTS OF CHEIRANTHUS.

M. Reeb reports (*J. d. Pharm. von Elsass-Loth.*, 1898, 207) a chemical investigation of the leaves and seeds of *Cheiranthus cheiri*, a common crucifera of Europe, sometimes cultivated and closely allied to the nasturtium.

After noting that Schlagdenhauffen and Reeb, Sr., had found the

extract was toxic to frogs, the writer reviews the confusing nomenclature of the plant and announces the separation of an alkaloid, as well as a glucoside similar to digitalin.

The separation is accomplished by treating the seeds, from which the oil (35 per cent.) has been removed (with petroleum ether) or the leaves with 65 per cent. alcohol. The alcoholic extract (yield from leaves 26 per cent.; from seed 47 per cent.) is dissolved in water, the solution cleared with lead acetate, filtered and the lead removed from the filtrate by careful addition of sulphuric acid, the formed lead sulphate being filtered off. From the filtrate the active principles can be separated either by precipitation with tannin (as directed by Tanret for the preparation of digitalin) or with a neutral salt like ammonium sulphate, as recommended by Thomas in the manufacture of strophanthin. In both cases the alkaloid and the glucoside are precipitated together, and are separated from the precipitant by solution in 2 parts alcohol and 1 of ether. These are separated by shaking an aqueous solution with ether (which dissolves only the alkaloid, or by precipitation of the alkaloid with phosphotungstic acid. The glucoside, cheiranthin, thus isolated, is faintly buff, is soluble in water, alcohol, chloroform and acetone, and insoluble in ether and petroleum ether. It hydrolyzes to a product that reduces Fehling's solution, and to one insoluble in water, but soluble in ether. Administered to a frog, it affects the heart as does digitalin. The alkaloid was not thoroughly examined, nor was a second inert alkaloid, presumably choline.

H. V. A.

SODIUM OXALATE AS A BASE FOR STANDARDIZING SOLUTIONS FOR ACIDIMETRY AND ALKALIMETRY.

S. P. L. Sörense ignites a given weight of sodium oxalate in a platinum crucible and uses the resulting carbonate in adjusting the acid. The advantages claimed are: (1) that it can be secured pure and dry; (2) it does not contain any water of crystallization and must, therefore, be of uniform composition; (3) it is neither deliquescent nor efflorescent, consequently the article can be kept any length of time without undergoing any change and can be weighed accurately. 1898, *Rev. de Chim. Industri*, 9, 304; from *Jour. Soc. Chem. Ind.*, 18, 74.

L. F. KEBLER.

EDITORIAL.

SUMMER WORK AND SUMMER VACATION.

To probably most people the summer vacation is associated with the thought of a time for securing physical culture, a recuperation of health and rest of mind from the exacting cares of the remainder of the year. A great many people, in taking their summer vacation, are physically recuperated by visiting places where the nights are cool and the air is pure; or by engaging in a strictly out-door life, either on the water, in fishing or sailing, or in the woods, camping and hunting. A great many persons also either own or rent summer residences, and devote their time to bathing, driving and riding, and to receiving their friends. Those who prefer a quiet life are distinguished from those who visit the hotels at the fashionable watering-places and mountains, in that the latter are beset with temptations for gluttony and intemperance, so that their vacation may resolve itself into a time of indulgence, rather than a time for recuperation of any kind.

There is a broader significance and value, however, in the summer vacation when it is associated with mental and spiritual culture, and this is what most people would call summer work. When one of the most esteemed citizens of the United States the other day said in an address: "I am very glad that I broke through my determination not to interrupt my vacation, and that I broke into my outing to be here to-day," he expressed a thought which is becoming more and more evident in the desire of at least some persons for mental culture and the willingness of others to impart this culture. A summer vacation can hardly be said to be truly complete when it only brings one back with a few more pounds of flesh and an apparent rest of nerves and muscles. That vacation only is truly complete that has been devoted to one's hobby, and in which, in addition to a physical recuperation, one's mind and soul are refreshed, reanimated, re-purified and re-created. During an ideal summer vacation one ought not only to wade the trout-stream and fish, but one ought to find here an opportunity for work, if you choose to call it such, where the mind is quickened and the soul brought into close touch with nature and nature's God. Do we wonder, then, that the orations of Demosthenes are still heard, and that in our own country the words of Webster still live? The one perfected his creations at the seashore, and the other as he waded the trout-streams with his rod.

It is surprising, when we think of it, how the impulse for summer work (*i. e.*, mental and spiritual culture) is growing in this country. In order to afford opportunities of this kind, one of our universities has its courses extending throughout the entire year. Many others have been successfully carrying on summer schools; as Harvard, Cornell, University of Wisconsin, etc. Then there are special laboratories for investigation and research; as the Marine Biological Laboratory, at Wood's Holl, Mass., and the laboratory at Cold Spring Harbor, L. I. Besides these, a certain number of advanced courses are offered in various places by the Society for Promoting University Extension. There are also opportunities for more or less elementary study of various subjects; as in the Chautauqua Societies and in the Natural History Camps; and we might add that the various scientific and other associations that hold annual meetings during the summer draw a large number who not only desire an outing and a bodily recreation, but who desire food for thought and a re-creation

in mind and soul. It is astonishing, too, how well all of these institutions and associations are attended, and apparently the more advanced the character of the courses offered, the better is the attendance and the more earnest the desire for mental culture. It is not presumed that in any of these institutions for study the work is carried out with anything like the "grinding" that is done during the other months in the year. In fact, there is a freedom to do what one chooses. The field excursions, sailing parties, etc., are frequent. And, though all are arranged with some one object, they entail the absorption of facts and observations in other subjects that help to stimulate to a newer, broader and higher life.

The question may be rightly asked, what is the significance of this summer work with summer vacation? Does it mean that when the great Agassiz, whom we may justly claim as our own, through the generosity of Mr. John Anderson, of New York City, was enabled to establish his new scheme of education of natural history in the summer school on the island of Penikese, in Buzzard's Bay, that he comprehended the heartfelt needs of the seekers for summer work and summer vacation who yearned for something more than physical culture, and who were thirsting for intellectual and spiritual associations free from the daily routine which attends the ordinary pursuits of life, whereby to satisfy their minds' desire for the truth and the light? Does it mean that the silent prayer, so fitly told in Whittier's poem, "The Prayer of Agassiz," is being answered to the fullest extent, in that while at Penikese we now find the ruins of these first laboratories for summer work, a few miles away are the now famous laboratories at Wood's Holl, and scattered over the country are now offered many opportunities for the study of nature in her manifold forms? It is true that at these schools we find more generally teachers or those who may become teachers, and it may be said that this combination of summer work and summer vacation is only a result of the "hurry-up" spirit of the times. We believe, however, that it rather speaks of the faithfulness of the teachers to their scholars in their desires for a grasp on the newer world of facts as revealed by other observers and a stimulus for future investigations.

Some may go to the summer schools because of a sense of duty, and some may be impelled by a sense of thrift, but the majority go because their aspirations lead them, like the wise men of old, to a common place, where they may not only open the door of nature, but where they may also learn of the interpretations of the observations of others; for as Emerson puts it: "into every intelligence there is a door which is never closed, through which the Creator passes." The real significance, we think, of these summer schools and the opportunities for summer work is the association with nature for intellectual and spiritual as well as physical culture. The greater benefits of the summer schools are observed in the more nearly uniform development of the intellectual, spiritual and physical nature.

REVIEWS AND BIBLIOGRAPHICAL NOTICES.

COMMERCIAL ORGANIC ANALYSIS. By Alfred H. Allen. Third edition. Edited by Henry Leffmann, M.D. Vol. II, Part I. Fixed oils, fats, waxes, glycerol, nitroglycerin and nitroglycerin explosives. Philadelphia: P. Blakiston's Son & Co. 1899. \$3.50.

This volume of Allen's well-known book is one of the most valuable, dealing, as it does, with the whole range of the fatty oils and their products. The previous second edition was a most satisfactory reference-book for chemists, and its value has been distinctly added to in this revised edition. It is true that there has appeared in the meantime a special work on this general subject that has immediately taken first rank, viz., Lewkowitsch's English edition of Benedict's "Oils, Fats and Waxes," but there is room for both books. While Allen is not quite so encyclopædic in taking up the list of fatty oils, his discussion of analytical methods is, in many cases, fuller and more satisfactory, and some of the technical side products of great importance find more adequate notice in Allen than in Lewkowitsch.

As in Vol. I of the American revised edition, noticed in this JOURNAL, Vol. LXX, p. 629, frequent reference is made to the official methods adopted by the Association of Agricultural Chemists, and these are given in full detail. Thus, on p. 38, we have the method for the determination of melting-point; on p. 59, Vollny's modification of Reichert's method in full, as adopted by the Association; and, on p. 183, the methods now adopted for butter analysis.

The special points of value in this revised edition are quite numerous, and we cannot more than select a few for special mention. The tables of the refractive power of different oils with the oleo-refractometer, on pp. 73 to 75, are valuable when taken with the working directions for the use of the instrument given on p. 72.

Twitchell's recent method for separating the fatty and resin acids is given, and fully discussed on p. 107.

The mention, on p. 150, of the newer siccatives, which are used in solution, such as the resinates of manganese and lead, is also satisfactory, as is the account of the use of aluminum oleate in adulterating heavy mineral oils for the purpose of fraudulently increasing the viscosity of the oil.

Very timely and important is the attention paid to the analysis of nitroglycerin and dynamite, on p. 337, and of cordite and smokeless powders, on p. 343.

The section on cloth oils (or wool oils), on p. 369, is also new and of great value.

We notice that reference is made at several points to Lewkowitsch's work on Oils, but no page is mentioned. This is a drawback, as it simply involves loss of time, if one must hunt it up from the index or table of contents.

We also looked in vain, under the mention of the tests for adulteration of olive oil, for Milliau's modification of Becchi's test. This modification has been endorsed by official recognition in both France and Italy as an improvement upon the original Becchi test.

The book, taken altogether, however, is simply indispensable to the working chemist who is interested in the chemistry of either food adulteration or the technical application of fatty oils.

S. P. S.

DIE ÄTHERISCHEN ÖLE VON E. Gildemeister und Fr. Hoffmann. Bearbeitet im Auftrage der Firma Schimmel & Co., in Leipzig. Mit vier Karten und zahlreichen Abbildungen. Berlin: Verlag von Julius Springer.

The progress of organic chemistry has in many instances placed many of the commercial industries on a more or less sound scientific basis. The more or less crude empirical methods have been supplanted by the more rational modes

of procedure in preparing the various commercial products. During the past ten years there has been witnessed, particularly in the researches of the ethereal oils, a most remarkable development, particularly through the researches of Professors Wallach, Baeyer and some other chemists. Probably no one has encouraged the scientific study of the essential oils to such an extent, and collated and distributed so much information relative to the newer scientific developments, and the substitutions and adulterations of the essential oils than have Messrs. Schimmel & Co., and no one is so familiar with all that is known, both in a commercial and scientific sense, in regard to ethereal oils as this firm. The preparation of the various natural oils is still regarded by some as an agricultural industry, but the chapter by Dr. C. von Rechenberg, in this new book, on the theoretical principles for the production of essential oils by means of distillation with steam, indicates, however, that a study of the laws of physics, particularly of heat, has much to do in the securing of not only quantity, but quality of product. The study of these oils for purposes of identification, detection of adulteration, as well as synthetic preparation and imitation requires, as is becoming more and more recognized, the most carefully trained specialists in this subject. Dr. E. Gildemeister, one of the editors of this book, is well known for his studies in this direction. The historical treatment of the essential oils in this work has been creditably performed by the able pen of Dr. Fr. Hoffmann.

The book is divided into four parts :

I. A historical treatment of the spices and allied products is given, particularly during ancient times and the middle ages ; also a historical treatment of essential oils with the old and new methods and apparatus employed in obtaining the same. Numerous well-made illustrations accompany the text, and we have, in the 136 pages devoted to this part of the work, a very comprehensive review of the progress in the discoveries and knowledge pertaining to essential oils, as well as their preparation from ancient times to the present as carried out in the largest laboratories devoted entirely to this subject to-day.

Part II is devoted to a general consideration of the subject of essential oils, and several specialists have written certain chapters. Dr. C. von Rechenberg has written a special chapter on the "*Theoretische Grundlage der Gewinnung der ätherischen Oele durch Dampfdestillation*," and Dr. J. Helle has contributed an article on "*Die Häufiger vorkommenden Bestandtheile der ätherischen Oele*." Two other important chapters complete this part of the book, viz.: one on the testing of ethereal oils and another with the names of the plants, arranged according to Engler's Syllabus (1893), that yield ethereal oils.

Part III, comprising over 600 pages, is devoted to a special consideration of all of the essential oils. It may be truly said that everything that is known concerning the history, origin and distribution of the plants producing the oils and the percentage of the latter, together with their general, physical and chemical properties, as well as chemical composition, adulteration, production and commercial importance, is here given. The citation of the important literature, together with the other information given, makes this part indispensable to every one, whether he be teacher, manufacturer, merchant or student, who has anything to do with the study or handling of essential oils. The character of the work

done and the fact that it has been brought up to the date of publication, are shown in many instances, of which we mention one. Under the constituents of American peppermint oil where in addition to the fifteen constituents of this oil, already noted by Power and Kleber in 1894, two other principles are added, viz.: Amyl alcohol and dimethyl sulphide [$S(CH_3)_2$]. The fact, too, that so much comparative information is given as, for instance, in the treatment of the properties of the different peppermint oils of America, England, Japan, Saxony, Germany, France, Italy, Bohemia, Chili and Peru, renders the work of inestimable value to the student, manufacturer and dealer in essential oils.

Part IV contains an index of plant names, oils and their constituents, which renders the work convenient for reference and all that is to be desired in this respect.

The binding and printing of the book are in accord with the contents of the book, and we have not seen a work recently which we consider of such scientific and practical value, and one which was needed so much by every one who has anything to do with the essential oils or the plants yielding them.

We are confident that this volume will be much appreciated by the botanist and chemist, as well as by the manufacturer and merchant, and recognized as a repository of everything pertaining to the scientific as well as practical and commercial knowledge of the essential oils.

AN INTRODUCTION TO THE STUDY OF MATERIA MEDICA, being a short account of the more important crude drugs of vegetable and animal origin. Designed for students of pharmacy and medicine. By Henry G. Greenish, F.I.C., F.L.S., Professor of Materia Medica and Pharmacy to the Pharmaceutical Society of Great Britain. With 213 illustrations. Philadelphia: P. Blakiston's Son & Co., 1012 Walnut Street. Price, \$5.25 net. 1899.

This book reminds us very much of the *materia medica* heretofore published. Several features are, however, worthy of note. It has been gotten up for students by one who has evidently gone to the trade centres for information, and who has carefully sifted the literature and studied the drugs described. This really makes it that the work speaks with something of authority on the sources, descriptions, constituents, uses and varieties of the drugs described. There is another valuable feature of the book in that the author credits the illustrations, when taken from other works, to the authors of them. Not only is this done in the preface, but the name of the author accompanies the illustration. The book is a valuable one, and notwithstanding its high price will doubtless have a large sale in this country among the students of pharmacy and medicine, for whom it was designed.

THE BOTANISTS OF PHILADELPHIA AND THEIR WORK. By John W. Harshberger, Ph.D., Instructor in Botany, University of Pennsylvania.

An introductory account is given of the rise and progress of botany in the region comprised within a radius of sixty miles of Philadelphia. Especial emphasis is laid upon the history of botany at the University of Pennsylvania, Academy of Natural Sciences, Philadelphia College of Pharmacy, American Philosophical Society in connection with other learned societies. A brief sketch is given of the region and its floral districts.

The biographical portion of the book concerns itself with the lives of the botanists prominent as collectors or authors. The only complete account of

John Bartram and his celebrated garden is contained within this book. Especial emphasis has been laid upon the early botanists and their published work. Those prominently identified with the progress of pharmaceutical botany are included.

The botanists of our own day come in for a considerable share of the biographer's attention. A unique feature of the book is the illustrations, chosen with much care. These illustrations preserve in an unchangeable manner the appearance of the more celebrated gardens and botanists, many reproduced for the first time by the photographer's art. In the appendices an historical sketch is given the scientific journals issued from the Philadelphia printing houses, as also an account of trees which are noteworthy either from a botanical or historical standpoint.

BRITISH PHARMACEUTICAL CONFERENCE.

The thirty-sixth annual meeting of the British Pharmaceutical Conference was opened on July 25, 1899, at Plymouth, Ireland. The city, which has been described as the metropolis of the West, abounds in many glorious historic associations. The President, J. C. C. Payne, of Belfast, gave a short account of the history of pharmacy in Ireland, which is an excellent *résumé* of the subject. Mr. Payne, in closing his address, referred to the bonds of fellowship which are growing between the pharmacists of Ireland and those of Great Britain. The fact that the meeting was held last year at Belfast, the commercial capital of Ireland, would seem to indicate a closer union and a stronger harmony tending to the advancement of pharmacy and all concerning it in all three countries during the new century now so fast approaching.

There were about the same number of papers communicated as in previous years, one of the most notable features being the fact that the authors are confining themselves year by year to strictly pharmaceutical topics, so that the year-book with the proceedings is becoming truly the repository of information pertaining largely to pharmacy. London was selected as the place of meeting of the Conference in 1900, and E. M. Holmes, Curator of the Pharmaceutical Society's Museums, was elected President for the year 1899-1900. The papers read at the Conference are reprinted in full in the *Pharmaceutical Journal* for July 29th, and we take pleasure in presenting brief abstracts of them as read and printed in that journal.

THE ASSAY OF THE OFFICIAL LIQUID EXTRACT, WINE AND VINEGAR OF IPECACUANHA.

BY E. H. FARR AND B. WRIGHT.

The authors have examined several ipecacuanha percolates and fluid extracts and have compared the following assay processes: (1) The official and (2) Wilson's alternative process, with (3) a process proposed by them and (4) a modification of the same for rapid working. The following is the process proposed by these authors:

Five c.c. of the fluid extract is placed in a small porcelain dish, 10 drops of diluted sulphuric acid B.P. added, with 5 c.c. of water, and the mixture evaporated over a water-bath until the volume of liquid is reduced to about 3 c.c.

This is run into a separator, the dish carefully rinsed with 10 drops of water, and then with 15 c.c. of chloroform, the whole being transferred to the separator. An excess of ammonia is added, and the mixture well shaken, and allowed to stand until the chloroform has separated. This is run off, and the agitation and separation repeated with two successive quantities of 5 c.c. of chloroform. The chloroformic solutions are bulked, and the alkaloids extracted by shaking with three successive quantities of 10 c.c. 1 per cent. sulphuric acid. The acid alkaloidal solutions are drawn off in turn and mixed. The alkaloids are finally recovered from this solution by repeating the treatment with ammonia and chloroform. The solution of the alkaloids in chloroform is then evaporated in a tared dish over a water-bath until all chloroform has been removed. The weight is taken, and the alkaloidal residue titrated with $\frac{N}{10}$ HCl and $\frac{N}{10}$ NaHO, as previously described.

The modified process, for employment in laboratories when economy of time is an object, is as follows :

Two c.c. of the fluid extract is acidified and evaporated, and the alkaloids extracted with chloroform, as described under No. 3. The chloroformic solution of the alkaloids is evaporated to dryness and the residue titrated at once.

The following results were obtained :

	No. 1.		No. 2.		No. 3.		No. 4.	
	Weight.	Titration.	Weight.	Titration.	Weight.	Titration.	Weight.	Titration.
B.P. process	1.92	1.60	1.64	1.26	1.83	1.41	1.88	1.25
Wilson's "	2.23	1.93	1.85	1.57	1.97	1.64	1.95	1.62
F. & W. "	2.20	2.02	1.90	1.78	2.04	1.82	2.06	1.73
Quick "	—	1.97	—	1.74	—	1.80	—	1.72

For the determination of the alkaloidal value of the wine and vinegar, the following modification is given :

Fifty c.c. of the sample is placed in a porcelain dish, 10 drops of diluted sulphuric acid added, and the liquid evaporated to about 5 c.c. It is then transferred to a separator, the dish rinsed with a few drops of water and 10 c.c. of chloroform, and the alkaloids separated and determined exactly as described in the process recommended for the fluid extract.

Several commercial samples of the wine were determined by this method with the results shown in the table on following page.

The alkaloids from the wine were almost colorless, and the titration results show that they are yielded in an almost perfectly pure condition. This is evidently attributable to the fact that the impurity present in the crude alkaloids from the liquid extract, and which is most probably of a resinous nature, is thrown down and filtered out in the process of conversion into the wine.

The vinegar was not examined, but as it is prepared by simple dilution of the fluid extract, it is evident that the process employed for the wine is equally applicable to this preparation.

Sample.	ALKALOID OBTAINED.		Percentage in Wine.
	By Weight.	By Titration.	
No. 1	0'031	0'031	0'062
No. 2	0'022	0'022	0'044
No. 3	0'042	0'040	0'080
No. 4	0'012	0'012	0'024
No. 5	0'040	0'036	0'072
No. 6	0'022	0'021	0'042
Average	0'028	0'027	0'054

MISCIBLE LIQUID EXTRACT OF IPECACUANHA.

BY F. C. J. BIRD.

The liquid extract of ipecacuanha of the present Pharmacopœia is, undoubtedly, a great improvement on the dried acetic extract official in the last edition of that work. The new preparation possesses the advantages of standard strength, good keeping properties, and fine aroma of the root, but these good qualities are accompanied by the minor defect, from a pharmaceutical point of view, of precipitation when diluted with weak alcoholic or aqueous liquids.

The cause of this precipitation is usually attributed to the presence of resinous substances in the liquid extract, although the view has been advanced that the turbidity is partly due to the decomposition product of a peculiar pectin compound. There have been no published statements as to the nature of the deposit which in the official formula for the wine is directed to be filtered out, but if the wine be not free from astringent matter the sediment will certainly contain a little alkaloid. A liquid extract not forming a precipitate on dilution would, therefore, not only save filtration, but what is often of greater importance, avoid the forty-eight hours' delay incidental to the preparation of vinum ipecacuanhæ by the present B.P. formula.

The constituents of ipecacuanha root, isolated and identified by various observers, are the following: Emetine, cephaeline, and a third alkaloid (unnamed), ipecacuanhic acid, volatile oil, fat, resin and sugar, all of which are probably contained in the official liquid extract. There are also present in the root pectin, waxy bodies, dextrin, mucilage, albuminous substances, starch (in large proportion), and coloring matter. Other principles of doubtful existence have also been described.

The resins of ipecacuanha have never been credited with either emetic, diaphoretic or expectorant effects, and their entire or partial removal can hardly affect the medicinal action of any preparation of the drug, at least as far as those particular properties are concerned.

When an equal volume of water is added to liquid extract of ipecacuanha and the mixture allowed to stand, the filtered liquid will generally be found to form a perfectly bright solution when diluted with detannated sherry wine, and the following process for rendering the official liquid extract "miscible" is based on this fact.

Liquid extract of ipecacuanha B.P. 1,000 c.c.
Distilled water 1,000 c.c.

Mix, and allow to stand in a cool place for twenty-four hours. Filter and wash the residue on the filter paper with a little distilled water until colorless, keeping the washings separate. Acidify the filtrate with acetic acid, *q.s.*, to a very faint acid reaction. Distil by the heat of a water-bath until the distillate (as shown by volume and specific gravity) contains 400 c.c. absolute alcohol. This will generally measure about 520 c.c. Reserve this portion of the distillate, and continue the distillation to recover remaining alcohol. Evaporate the residue on the water-bath to about 420 c.c., allow to cool and pour off the bright liquid from any slight deposit of oily or resinous matter adherent to the dish. Add this to the reserved distillate. Rinse the dish with the washings obtained in the first part of the process, and filter, if necessary, and evaporate to make the total volume of the preparation equal to 1,000 c.c. Similarly a *glycerole of ipecacuanha* may be prepared as follows:

Liquid extract of ipecacuanha 1,000 c.c.
Distilled water 1,000 c.c.

Mix as before, allow to stand, filter and wash the residue, evaporating the washings separately. Acidify the filtrate with acetic acid to a very faint acid reaction, distil off the alcohol, and evaporate on a water-bath (adding the evaporated washings toward the end).

To 500 c.c.
Add glycerin 500 c.c.

This also forms a clear solution with detannated wine, syrups or aqueous liquids. It contains the B.P. proportion of alkaloid, and for many obvious purposes furnishes a convenient preparation of ipecacuanha.

An alternative process for the direct preparation of miscible liquid extract of ipecacuanha was also tried, and found to work well. It is as follows:

Ipecacuanha root in No. 120 powder 2,250 gms.
Calcium hydroxide 225 gms.
Alcohol (90 per cent.) a sufficiency.

Pack the powdered ipecacuanha root lightly but uniformly in a conical percolator, add successive portions of 400 c.c. of the alcohol at intervals of twelve hours until the liquid begins to drop from the percolator; close the lower orifice, and set aside for twenty-four hours. Then percolate slowly until 700 c.c. have been collected. Continue the process as detailed in the Pharmacopœia. Recover the alcohol from the remaining percolates, evaporate on a water-bath to a soft extract, dissolve in the reserved portion and assay by B.P. method. Finally dilute with alcohol (90 per cent.) to a volume that shall contain 5 grammes of the alkaloids in 100 c.c.

Take of liquid extract of ipecacuanha (5 per cent.) 900 c.c.
Distilled water 100 c.c.

Mix, set aside for twenty-four hours in a cool place and filter. Wash the filter with sufficient distilled water to produce 2,000 c.c.

THE ASSAY OF THE LIQUID EXTRACT AND WINE OF IPECACUANHA OF THE B.P., 1898.

BY W. A. H. NAYLOR AND JOHN J. BRYANT.

The authors experimented with a number of processes, of which the following are deserving of mention.

(1) *The Lime Process*.—To 5 grammes of slaked lime in a basin add 5 c.c. of liquid extract, care being taken to prevent the latter from coming into direct contact with the containing vessel. The measure is rinsed with alcohol and the rinsings added to the lime mixture, and the whole dried over a water-bath. The dry residue is next exhausted in a Soxhlet by boiling ether. The ethereal solution is extracted with $\frac{1}{2}$ per cent. sulphuric acid, and the latter with ammonia and chloroform. The residue from the chloroformic extractions was dried and weighed.

The only object in including Glenard's process is to point out the exact cause of the low results yielded by it. The explanation is rendered possible by the elaborate researches of Paul and Cownley on ipecacuanha. Small quantities of the alkaloids, emetine and cephaeline in a pure condition were treated alone and separately by the lime process exactly as with the liquid extract, the alkaloid being first dissolved in alcohol. The results here tabulated clearly show that the loss of alkaloid is due to the action of the lime on the cephaeline, the emetine being uninfluenced by the treatment.

TABLE II.—LIME PROCESS WITH PURE ALKALOIDS.

Alkaloid.	Amount Taken.	Amount Returned.	Per Cent. Returned.	Per Cent. Loss.
Emetine	0.100	0.098	98	2
Cephaeline	0.074	0.060	81.09	18.91

(2) *Kieselguhr Process*.—To 5 grammes of kieselguhr, freed from every trace of lime, placed in a porcelain basin, add 5 c.c. of the liquid extract, and dry the mixture over the water-bath. The dry powder, after transference to a Soxhlet, is then treated throughout by Ransom's¹ ammoniated chloroform process. The chief drawbacks to this method are the time and care required for its exact performance.

(3) *Process*.—To 5 c.c. of the liquid extract, placed in a porcelain basin, add two drops of diluted sulphuric acid, and heat over the water-bath gently to drive off the spirit. The acid solution is then transferred to a separator, together with the small portions of water used for washing the basin, ammonia is added in excess, followed by 10 c.c. of chloroform and agitated. The agitation and separation with chloroform is twice repeated. The chloroformic solutions are mixed and extracted with 10 c.c. of $\frac{1}{2}$ per cent. sulphuric acid thrice repeated. The separated acid solutions are united, rendered alkaline with ammonia and extracted with three successive 10 c.c. of chloroform. The chloroformic solutions are evaporated and the residue dried, weighed and titrated with $\frac{N}{10}$ HCl. Although the process is not open to the charge of inaccuracy, it has the one serious defect of consuming much time, owing to the

¹ "Year-Book of Pharm.," 1887, p. 450.

great difficulty with which the separations take place, even when the separator is immersed in hot water. After giving this process a fair trial and experimenting further, the authors decided to abandon it and to adopt the following :

(4) *Process*.—Place 10 c.c. of liquid extract in a basin over a warm water-bath until the alcohol is dissipated. The solution is transferred to a 50 c.c. flask, and the basin is washed with small portions at a time of a mixture of 2 c.c. of diluted sulphuric acid and 30 c.c. of water. The solution is filtered and water passed through the filter until the volume measures 50 c.c. Of the filtrate 25 c.c., representing 5 c.c. of liquid extract, is transferred to a separator, together with the small portions of water used for washing the measure, and the solution is shaken up with 10 c.c. of chloroform. After removal of the separated chloroform, the solution is agitated with another 10 c.c. of chloroform, which, after separation, is also withdrawn. The solution is then made alkaline with ammonia and extracted successively with 3×10 c.c. of chloroform. The chloroform solutions are mixed, evaporated and the residue weighed and titrated with $\frac{N}{10}$ HCl.

The accuracy of this process is shown in an appended table, which gives strictly comparable results on the same sample of liquid extract. An additional recommendation is the rapidity with which the assay can be made. Its distinctive feature is the removal of the resinous substances by a rapid and simple method without loss of alkaloid, thereby making possible the quick separation of the chloroformic solutions.

TABLE III.—COMPARATIVE RESULTS.

Process.	Amount of Liquid Extract Taken in C.c.	Weight of Alkaloid Obtained.	C.c. of $\frac{N}{10}$ HCl Absorbed.	Yield of Alkaloid by Titration.	Amount of Impurity.	Alkaloid in Grammes per 100 C.c. Liquid Extract.	
						By Weighing.	By Titration.
B.P., 1898 . .	20	0.402	14.0	0.3374	0.0646	2.010	1.687
Wilson's . .	20	0.400	13.5	0.32535	0.07465	2.000	1.62675
Lime	5	0.088	2.8	0.06748	0.02052	1.760	1.3496
Kieselguhr .	5	0.106	4.0	0.0964	0.0096	2.120	1.928
No 3	5	0.114	4.2	0.10122	0.01278	2.28	2.0244
No. 4	5	0.110	4.1	0.09881	0.01119	2.20	1.9782

In the above examinations the separations in most cases were troublesome, owing to the liquid extract being very resinous.

The calculations are made upon the basis that 1 c.c. of $\frac{N}{10}$ HCl is equivalent to 0.0241 gramme of mixed alkaloids, titration being conducted as given in the B.P., 1898, page 104, under belladonna assay.

As alkaloidal residues differ in their degrees of purity, we are of opinion that their amount should not be determined by gravimetric processes, but that their titration should be insisted on.

In the following table the results given are obtained from six samples of liquid extract by the foregoing processes, titrations excepted, and by the processes respectively of Wilson and the Pharmacopœia :

TABLE IV.—ASSAYS OF LIQUID EXTRACT.¹

No. of Sample.	B.P., 1898, Process.	Wilson's Process.	Lime Process.	Process No. 3.	Process No. 4.
1 (a)	1'94	2'25	1'28	—	—
(b)	2'0	2'13	1'38	—	—
2 (a)	2'94	3'16	2'2	3'384	—
(b)	2'995	3'11	2'1	3'296	—
3 (a)	1'90	2'053	1'452	2'268	2'273
(b)	1'905	2'014	1'521	2'301	2'289
4 (a)	3'025	3'275	1'64	3'584	3'528
(b)	3'001	3'112	1'484	3'406	3'413
5 (a)	1'886	2'013	1'382	2'304	2'289
(b)	1'950	1'998	1'525	2'288	2'249
6 (a)	1'996	2'135	1'463	2'401	2'368
(b)	1'935	2'104	1'612	2'397	2'349

¹ The figures refer to grammes of alkaloid per 100 c.c.

For the assay of the wine the following adaptation of the previous process is recommended. One hundred c.c. is evaporated over the water-bath to 10 c.c., a little kieselguhr stirred in, the mixture transferred to a beaker and the basin washed with the mixture of 2 c.c. of dilute sulphuric acid and 30 c.c. of water. The solution is then filtered and water passed through the filter until the volume measures 50 c.c. Of this filtrate 25 c.c. is taken, which represents 50 c.c. of the wine, and the remaining operations are conducted as detailed in process No. 4.

The appended table shows the results yielded by three samples of wine :

TABLE V.—VINUM IPECACUANHÆ, B.P., 1898, ASSAYED BY PROCESS 4.

Sample.	Amount of Wine Taken.	Weight of Alkaloid Obtained.	C.c. of N ₁₀ HCl Consumed.	Alkaloid Amount by Titration.	Amount of Impurity.	Alkaloid in Grammes per 100 C.c. of Wine.	
						By Weighing.	By Titration.
1 (a)	The representative of 50 c.c. for each assay.	0'039	1'5	0'03615 •	0'00285	0'078	0'0723
(b)		0'037	1'4	0'03374	0'00326	0'074	0'06748
2 (a)		0'044	1'8	0'04331	0'00069	0'088	0'08662
(b)		0'040	1'65	0'039765	0'000235	0'080	0'07953
3 (a)		0'033	1'3	0'03133	0'00167	0'066	0'06266
(b)		0'030	1'2	0'02892	0'00108	0'060	0'05784

The authors recommend a modification of process No. 4 for the assay of the wine, as follows : 100 c.c. are evaporated on a water-bath to 10 c.c. and a little kieselguhr stirred in ; the mixture transferred to a beaker and the solution washed with the sulphuric acid and water mixture, the subsequent steps being much as before. A table is appended in the original, showing the results obtained in the examinations of the wine by this process.

JOHORE IPECACUANHA.

BY JOHN C. UMNEY AND RALPH S. SWINTON.

The authors have examined Johore ipecacuanha, the root of *Psychotria emetica*, and state that it differs but little in character from the same root imported from Brazil. The proportion of total alkaloids present was found to be 1.7 per cent., and the mean of three experiments showed the percentage proportions to be emetine, 72.94, cephaeline, 22.94, other alkaloidal matter, 4.12, the figures corresponding closely with those recorded for the Brazilian root. It is suggested that there appears to be no reason why the root should not be used for making standard preparations of ipecacuanha.

THE ALKALOIDAL STRENGTH OF COMMERCIAL SAMPLES OF THE OFFICIAL PREPARATIONS OF JABORANDI.

BY E. H. FARR AND R. WRIGHT.

The authors, having experienced great difficulty in preparing standard preparations of jaborandi from commercial samples of the leaves, have conducted an investigation into the strength of the tincture and liquid extract as found in pharmacy, the process employed for the determination of the alkaloids being the one devised by the authors in connection with their former work on tincture of jaborandi. As a result, they find that the galenical preparations of jaborandi found in retail pharmacies at the present time are very deficient in strength, only containing about one-fifth the proportion of active constituents which, judging from the official doses, they are supposed to contain. The explanation suggested is that the best jaborandi leaves are being withdrawn from the drug markets, and so prevented from coming into the hands of pharmacists.

THE ASSAY OF PREPARATIONS CONTAINING PILOCARPINE AND THE CHARACTERS OF THE PILOCARPINE NITRATE AND HYDROCHLORIDE.

BY H. A. D. JOWETT.

The author deals with the assay of preparations containing pilocarpine and the characters of salts of that base. Having extracted the mixture of amorphous bases from jaborandi or its preparations, he dissolves them in a small quantity of a saturated alcoholic solution of pilocarpine nitrate, adds some strong alcoholic solution of nitric acid, and then sets the mixture aside to crystallize. The crystals which form are filtered off, drained by the filter pump, washed with more saturated alcoholic solution of pilocarpine nitrate, dried and weighed. The percentage of bases in the total alkaloid yielding crystalline nitrate can then be calculated. In most cases the total alkaloid may be assumed to be pilocarpine, but if a very accurate determination be required, the melting-point and specific rotation of the nitrates should be determined.

With regard to the characters of the pilocarpine salts, the author thinks that the nitrate should consist of permanent white crystals, soluble in 6 or 7 parts of water and 146 parts of 95 per cent. alcohol, fairly soluble in boiling alcohol but almost insoluble in ether or chloroform. When heated in a capillary tube the salt should melt at 176° to 178° , and its specific rotatory power in aqueous solution should be $+81^{\circ}$ to $+83^{\circ}$. No residue should be left on ignition, and there should be no precipitate on adding ammonia water, or sodium, or potassium hydroxide to a concentrated aqueous solution. The hydrochloride should form deliquescent crystals, soluble in less than their own weight of water, and in 10 parts of absolute alcohol, but almost insoluble in ether or chloroform. The dried salt should melt at 200° to 204° , and its specific rotatory power should be $+90^{\circ}$ to $+92^{\circ}$. No residue should be yielded on ignition, and a concentrated aqueous solution should give no precipitate with ammonia water, and only a few oily drops, which quickly redissolve, on the addition of sodium or potassium hydroxide.

DELPHINIUM STAPHISAGRIA.

BY E. M. HOLMES.

The author directs attention to the fact that the true *Delphinium Staphisagria* is practically unknown in botanic gardens of England, and that the plant which passes under that name is really another species, viz., *D. pictum*, Willd. The difference between these two species is given in detail in the paper.

THREE NATURAL RUBBER SUBSTITUTES.

BY DAVID HOOPER.

The author describes three elastic gums which have been suggested as rubber substitutes. The first is obtained from the stem of *Ficus bengalensis*, and dissolves without previously swelling in ether, chloroform and carbon disulphide. It contains a large proportion of resins. The second is the product of *Calotropis gigantea* and *C. procera*, and contains but little caoutchouc. The third substance is the coagulum of the milky juice of *Excoecaria azallocha*, Linn. It possesses irritating properties, and that fact, conjoined with the presence in the substance of alcohol-soluble resins, contraindicates its fitness to serve as a rubber substitute. None of the three substances, in fact, appears suitable for that purpose.

THE LIBERATION OF CO₂ FROM SODIUM BICARBONATE BY HEAT.

BY C. S. DYER.

In this paper the author deals with the liberation of carbon dioxide from sodium bicarbonate when heated, and doubts the accuracy of Cowie's statement that the salt decomposes at a temperature between 50° and 60° C. In his opinion, the detection of traces of carbon dioxide by a delicate test on exposing a bicarbonate to a temperature of about 55° C. is not sufficient evidence that the salt decomposes at that temperature to any practical extent, and he asserts that dry sodium bicarbonate scarcely decomposes at all below 60° C., only slowly below 100° C., but rapidly above 120° C.

THE DETERMINATION OF DIABETIC GLUCOSE. PICRIC AND FEHLING'S METHODS COMPARED.

BY R. H. PARKER.

A comparison of the picric and Fehling methods for the determination of glucose in diabetic urine shows that the advantages of the latter when dealing with high percentages may be realized in an equal degree by adding a known quantity of glucose before determination. He finds that the production of opacity in Fehling's solution by alkalized urine is characteristic of glucose. "Interfering substances" do not produce that opacity, and rarely occur in greater quantity than a picric indication of 0.35 per cent. of glucose. When the picric indication falls below 0.4 per cent., the actual amount of glucose present may be approximately ascertained by noting the point at which opacity appears. Finally, samples of urine giving the non-subsiding yellow cuprous oxide may be rapidly assayed with Fehling's solution, if previously mixed with an equal volume of 6 to 8 per cent. glucose solution.

ANALYTICAL NOTES ON THE B.P. LOZENGES.

BY FREDERICK DAVIS.

In the following table are given the results of a series of analyses of B.P. lozenges, showing the quantity of active principles found in each lozenge.

It will be observed the quantity of active ingredient is very nearly that which the B.P. directs, and, taking into consideration experimental error, the constants are good excepting in the lozenges of sodium bicarbonate and sulphur, and in these cases there appears to be a laxity in making which should not exist. In the reduced iron lozenge the determination was calculated upon 75 per cent. basis of metallic purity. In the rhatany and cocaine lozenge the cocaine hydrochloride only was determined, and similarly the morphine hydrochloride in the morphine and ipecac lozenges. No examination of the basis has been made in any case :

Sample.	Benzoic Acid.	Carbolic Acid.	Tannic Acid.	Bismuth.	Catechu.	Eucalyptus.	Reduced Iron.	Guaiacum.	Ipecac.	Krameria.	Krameria and Cocaine.	Morphine.	Morphine and Ipecac.	Potassium Chlorate.	Santonin.	Sodium Bicarbonate.	Sulphur.
I .	'54	1'01	'51	2'1			1'2				'038	'028	'029	3'2	'98	4'2	6'5
II .	'55	1'01	'50	2'03			1'1				'049	'030	'031	3'02	1'02	3'5	5'9
III .	'52	1'12	'54	2'00			1'00				'044	'028	'028	3'19	1'15	3'1	5'2
IV .	'50	1'08	'53	2'09			1'05				'05	'026	'029	3'2	1'1	3'3	5'3
V .	'52	1'14	'49	1'97	Not determined.	Not determined.	1'03	Not determined.	Not determined.	Not determined.	'042	'027	'031	3'6	'92	4'1	7'4
VI .	'54	'98	'49	2'00			1'18				'051	'032	'027	3'03	1'21	3'9	6'9

HYDROGEN PEROXIDE.

BY CHAS. T. TYRER.

The author has endeavored to give some idea of the rate of decomposition and the protective value of various agents in solutions of hydrogen peroxide.

The author considers hydrochloric acid to be the worst protective agent and phosphoric acid the best, glycerin coming second. Champagne quarts and soda-water bottles are found to be less liable to break in transit than other containers of hydrogen peroxide solution; beer bottles with patent screw stoppers come next in order. It is recommended that the containers be always filled to within about two inches of the corks. For storing the peroxide in a laboratory, the author advises the use of a receiver with a tap at the base, the solution being protected by a layer of petroleum carefully poured on the surface.

LIQUOR BISMUTHI ET AMMONII CITRATIS.

BY FRANK R. DUDDERIDGE.

The author adopts a method of assay which differs from the B.P. process in the following respects:

(1) The solution of bismuth oxynitrate in equal volumes of nitric acid and distilled water is *not* added till opalescence is produced; it is not diluted at all; (2) the order of mixing is reversed, the potassium salts not being added to the bismuth, but the bismuth poured carefully into the solution of the potassium salts, which is kept well stirred all the time; (3) the potassium salts are dissolved in a definite quantity of water, two fluidounces for an imperial pint of product, or 100 c.c. for a litre. This forms a thick magma, to which is added another two ounces or 100 c.c. of water, then heated to the boiling-point, thrown on to a filter and washed with hot water until free from nitrate contamination, when it is easily soluble in liq. ammoniæ. He also finds that if the quantity of potassium carbonate be increased by one-third, *i. e.*, 240 grains or 27 grammes being used in place of 175 grains or 20 grammes, the washings are practically neutral, and very little, if any, loss of bismuth results. With these slight modifications, the B.P. process may be easily and speedily performed in any pharmacy.

THE EXAMINATION OF THE TERPENELESS OILS OF LEMON AND ORANGE IN THE MARKET.

BY T. H. WILLIAMS IDRIS.

The author has examined the terpeneless oils of lemon and orange on the market, and records the results, which show great difference in the value of the respective products. Users of terpeneless oils are warned to exercise caution in purchasing so-called "terpeneless" and "concentrated" lemon oils offered at absurd prices.

TEREBENE, B.P.

BY LEWIS OUGH.

The author has attempted to ascertain to what extent commercial specimens of terebene correspond with the B.P. requirements for that article, and, as a result, he finds that it is most varied in its composition, only one sample out of twelve being in strict accordance with those requirements. The solubility of the samples in 90 per cent. alcohol varied from 4.75 to 6 per cent., the solubility in pure ether (specific gravity, 0.720) from 1 in 10 to 1 in 20, and the solubility in methylated ether (0.717) from 1 in 1.4 to 1 in 2.5. The optical rotation also varied greatly in the different samples.

OIL OF CARDAMOMS.

BY E. J. PARRY.

The author points out that the chemistry of oil of cardamoms is in a very "hazy" condition, owing to the fact that those who have reported on the subject rarely state what they mean by "cardamoms." For experimental purposes the author has had Malabar and Mysore cardamoms specially distilled, and has examined the resulting oils. The Malabar cardamoms yielded 1.3 per cent. of oil and the Mysore variety 2.6 per cent. They were both light-yellow in color, scarcely distinguishable in odor, and having a specific gravity of 0.948; but whilst the optical rotation of the Malabar oil was $+40^{\circ} 41'$, that of the Mysore oil was $+46^{\circ} 39'$. The oils were soluble with a slight opacity in 40 to 45 volumes of 60 per cent. alcohol, and but little difference was apparent between them. Inasmuch, however, as the Mysore cardamoms yield twice as much oil as the Malabar variety, the former are preferable for distillation purposes.

ALMOND AND OTHER KERNEL OILS.

BY RALPH S. SWINTON AND JOHN C. UMNEY.

The authors are of the opinion that the B.P. test for almond oil is not defined with sufficient accuracy, but that inability to comply with its requirements indicates admixture with apricot kernel oil. Certain marked differences are also shown when the test is applied to apricot and peach kernel oils.

THE COMPOSITION OF COMMERCIAL ARAROA.

BY EDWIN DOWZARD.

The following table gives the results obtained in the examination of nine samples of commercial araroba:

No. 1.			No. 2.			No. 3.			No. 4.		
	Sample as Rec'd.	Dried Sample.		Sample as Rec'd.	Dried Sample.		Sample as Rec'd.	Dried Sample.		Sample as Rec'd.	Dried Sample.
Chrysarobin . .	54'90	78'50		51'37	75'61		62'39	76'65		64'40	82'67
Water	30'06	—		32'06	—		18'60	—		22'10	—
Woody fibre, etc.	14'13	20 20		14'02	20'64		18'51	22'74		13'20	16'95
Ash	0'91	1'30		2'55	3'75		0'50	0'61		0'30	0'38
	100'00	100'00		100'00	100'00		100'00	100'00		100'00	100'00

No. 5.			No. 6.			No. 7.			No. 8.			No. 9.		
	Sample as Rec'd.	Dried Sample.		Sample as Rec'd.	Dried Sample.		Sample as Rec'd.	Dried Sample.		Sample as Rec'd.	Dried Sample.		Sample as Rec'd.	Dried Sample.
	65'99	85'14		62'00	75'51		43'79	59'02		44'34	51'80		49'97	62'70
	22'50	—		17'90	—		25'80	—		14'40	—		20'30	—
	11'11	14'35		19'71	24'01		26'90	36'25		32'96	38'50		23'27	29'20
	0'40	0'51		0'39	0'48		3'51	4'73		8'30 ¹	9'70		6'46 ¹	8'10
	100'00	100'00		100'00	100'00		100'00	100'00		100'00	100'00		100 00	100'00

¹ Consists principally of coarse sand.

SYRUP OF BALSAM OF TOLU.

BY E. H. FARR AND R. WRIGHT.

The authors point out that the loss of volatile matter in the process of boiling tolu balsam with water, and the subsequent copious separation of crystals appear to indicate that the official method for preparing syrup of tolu is somewhat defective. As the result of experiments they find that the official syrup liable to vary considerably, according to the time of year when it is made, and further that the solution obtained on boiling the tolu with water should be filtered as soon as it reaches a given temperature, and immediately converted into syrup. Several samples of the syrup have been prepared by different processes, and the authors suggest the replacement of the official process by one in which the tolu is first dissolved in 90 per cent. alcohol, the solution added to water previously heated to 70° C.; the mixture is shaken well and set aside for twenty-four hours, then filtered bright, and mixed with seven times its volume of simple syrup. The solution may be kept and diluted as required. The crystals which deposit in cold weather dissolving when the bottle is removed to a warm place.

THE STRENGTH OF CAPSULES OF BLAUD'S PILLS OF COMMERCE.

BY C. E. STUART.

The author has had occasion to examine a number of capsules containing Blaud's pill, and in each case he found the iron salt was rendered semi-fluid by admixture with liquid paraffin or some other oily body. The iron contents of the capsules varied considerably, but, judging from some of the samples examined, the author is of opinion that the problem of preparing a small and active Blaud's pill capsule has as yet not been satisfactorily solved.

FURTHER NOTE UPON FERRUM REDACTUM B.P., 1898.

BY E. SAVILLE PECK.

The author has compared his results of the determination of ferrum redactum by the methods of the British and United States Pharmacopœias with those of the "iodine method." He finds that the mercuric chloride and iodine methods give almost similar results with samples differing widely in percentage of pure iron, and, from that fact, he thinks it may be inferred that one corroborates the other. Attention is also again directed to the fact that the copper sulphate method invariably gives a higher reading than the mercuric chloride method, the average difference varying in different samples, whilst the lower the percentage of pure iron in the sample the greater is the difference in the results of the two methods. The copper sulphate method is, therefore, held to be less satisfactory in use than the other two methods.

THE ASSAY OF BELLADONNA PLASTERS.

BY H. J. HENDERSON.

The author gives the details of a process for assaying belladonna plasters prepared in accordance with the B.P. formula. The plaster is allowed to disintegrate with ether and the mixture is then shaken with acetic acid. Sulphuric acid is next added to the separated acid liquor, the lead sulphate allowed to subside, and the belladonna extract separated from the other constituents of the plaster. The alkaloids are then shaken out with ammonia and chloroform,

next taken up with hydrochloric acid, and finally obtained in crystalline form and weighed. Applying the process to a plaster prepared by himself from liquid extract of belladonna, the author found the plaster contained exactly 0.5 per cent. of alkaloid.

MELTING-POINTS.

BY T. TYRER AND A. LEVY.

The results of a series of determinations of melting-points are given by the authors, five methods being employed for each substance—phenacetin, sulphonal, acetanilide and phenazone. The methods were that official in the B.P., Graebe's, Landolt's, Piccard's and Loew's. Somewhat high results were obtained with the B.P. method, but Graebe's and Landolt's methods were found to agree fairly well.

A NOTE ON COMMERCIAL CARBON DISULPHIDE.

BY W. ELBORNE.

The author kept 200 c.c. of the best commercial carbon disulphide in a clear glass bottle, corked and capped with parchment paper, for six months, and exposed to strong diffused daylight. A flocculent brown precipitate was formed, which showed no traces of sulphur and when heated gave off an inflammable vapor, leaving a residue of carbon. The author concludes that either the CS₂ contained impurities (probably derived in part from the cork) or that it is itself decomposed when kept in a cork-stoppered bottle. He recommends that CS be kept in a glass-stoppered bottle, and as far as possible from the light.

DRUG STANDARDS.

C. G. MOOR AND C. H. CRIBB.

The authors suggest the voluntary adoption of standards of purity by pharmacists, analysts and other interested persons. The substances selected as typical for the purposes of this paper are dill fruit, cayenne pepper, cloves, ginger, saffron, mace, malt extract and pimento, tinctures of aconite, arnica, cantharides, hyoscyamus and rhubarb.

THE SALIENT FEATURES OF THE FLORA OF DEVONSHIRE.

BY G. C. DRUCE.

The county of Devon possesses more than 100 species which are not native in Ireland, nearly 140 which are not native in Scotland, and nearly 180 which do not occur in Oxfordshire.

WEIGHT BURETTE.

BY E. SAVILLE PECK.

The author describes a burette which can be weighed before and after titration, thus giving the weight of the solution used instead of its volume. It is claimed that the errors arising from inaccuracy of calibration are entirely eliminated, and that changes and differences in temperature exert no influence upon the results.

THE BONE CAVES OF SOUTH DEVON.

BY R. HANSFORD WORTH.

This is a very interesting short note on the bone caves of Devon.

CORRESPONDENCE.¹

CÚCUTA, COLOMBIA, January 9, 1899.

Mr. William P. Wilson, Philadelphia.

DEAR SIR :—We send you samples of the fluid extract and of the chopped root of *Jatropha gossypifolia*, that you may have an opportunity to experiment with it and make the results to be widely known.

We have been induced to do so through the use that we made lately of the juice of the plant as a powerful therapeutic agent in a case of Greek leprosy or elephantiasis. Nevertheless, its action is simply purgative and emetic. It can be placed among the strong purgatives, with a much surer action than jalap, scammony, gum-gutta, turpeth root, etc. Its emetic action is weaker than that of ipecacuanha. As it is found in great abundance, it could take the place of all other plants of its class, and on that account we hasten to inform you.

We have calculated the maximal dose of the fluid extract at 3 grammes for an adult, although we think that not more than 0.50 gramme should be used at once. This preparation offers great advantages in therapeutics, which should not be despised, especially when its growth is abundant, the cultivation easy and not at all costly.

Will you please inform us in regard to the price at which it could be sold in that country as a trial export article? We believe that it is more or less our duty to help matters along toward progress and industry.

Remaining entirely at your orders, we subscribe ourselves,

Your attentive servants and friends,

MANTILLA Y CIA.

 MINUTES OF COLLEGE MEETING.

A quarterly meeting of the members of the Philadelphia College of Pharmacy was held at the College, June 26th, at 4 P.M., President Charles Bullock in the chair. Eighteen members were present. A letter was read from the Secretary, W. Nelson Stem, regretting inability to be present on account of sickness in his family. J. W. England was elected secretary *pro tem*.

The minutes of the March meeting (Wm. B. Thompson, Secretary) were read. The minutes were then adopted as amended.

The minutes of the April, May and June meetings of the Board of Trustees were read and approved.

The amendment to Chapter IV, Article IV, of the by-laws, proposed at the March meeting of the College, was adopted.

Prof. J. P. Remington gave an interesting verbal account of the recent meetings of the Pennsylvania Pharmaceutical Association held at the College. The meetings were very well attended, the papers were good, the business of the Association was satisfactorily and expeditiously done, the social features evoked general praise, and, altogether, the meeting was one of the most successful of years. A pleasing feature of the meeting was the election of a

¹ The above letter sent to Dr. W. P. Wilson, Director of the Philadelphia Commercial Museums, is a translation of a communication received by the Philadelphia Museums from a correspondent in the United States of Colombia. The samples referred to are in the Museums' collection and may be seen by any one interested.

fellow-member of the College—Dr. Charles A. Weidemann, '67—as a vice-president of the State Association.

The following delegates were appointed to attend the meeting of the American Pharmaceutical Association, to be held at Put-in-Bay early in September next: Prof. Henry Kraemer, F. W. E. Stedem, Wm. McIntyre, Wm. L. Cliffe, George M. Beringer. The delegation was given power to fill vacancies.

The meeting, on motion, adjourned.

J. W. ENGLAND,
Secretary pro tem.

PERSONAL.

CHARLES F. CHANDLER.—To few men is given the privilege of seeing the fruition of their labors while still full of all the powers of the mind and body. Thirty-five years ago Dr. Chandler—then not quite thirty years of age—started, with the co-operation of Professor Eggleston and General Vinton, the School of Mines of Columbia College. Leaving Union College with an assured income and everything that could be desired in many ways, he ventured on what seemed to be to others an unpromising project, without a salary and with an institution poorly equipped in every way, but with men of brains, enthusiasm and determination to succeed. Since that time the school has grown, until the chemical department alone has the most elegant and commodious building devoted to chemistry to be found anywhere (known as Havermeyer Hall, and provided by the Havermeyer family), costing \$750,000, and equipped with almost everything that can be desired.

Professor Chandler has been a pioneer in many directions. Born in Lancaster, Mass., with that "I-want-to-know" disposition, he was not content with the realization of years of scientific studies in Harvard, Göttingen and Berlin, but determined to turn it to account for the benefit of the people with whom he lived, and who called upon him for his services. As a chemist and subsequently as President of the Board of Health in New York City, he contributed a noteworthy chapter to the sanitation of the city. He was instrumental in securing the introduction of a proper system of plumbing and house drainage, the permanent system of gratuitous vaccination, the proper care of contagious diseases in special hospitals, the abatement of the sludge oil nuisance, the regulation of the sale of dangerous kerosene oil, adulterated liquors, and the regulation of the water and milk supplies, etc., etc. Any one who has heard Dr. Chandler lecture daily for four years readily comprehends why he has not written books, as his time has been so fully occupied with the demands of his students as well as the public. There are probably few other teachers whose lives so enter into their work, and the notes of whose lectures are considered so invaluable, as that of Professor Chandler.

Many persons look upon Professor Chandler as being a "lucky" man. But if there is any man who is a living example of the essay of Sydney Smith on "Labor and Genius," it is Dr. Chandler. Every institution and organization with which he has been associated from its humble beginnings has sprung, through his unselfish and never-ceasing labors, to be recognized as a power for good. It is but natural for the multitude—who do not comprehend the powers of Dr. Chandler—to cry out

"a miracle of genius;" "yes, he is a miracle of genius because he is a miracle of labor; because, instead of trusting to the resources of his own single mind, he has ransacked a thousand minds; because he makes use of the accumulated wisdom of the ages, and takes as his point of departure the very last line and boundary to which science has advanced; because it has ever been the object of his life to assist every intellectual gift of nature, however munificent and however splendid, with every resource that art could suggest, and every attention diligence could bestow." All of his students know this too well. The Chemical Museum of Havermeyer Hall—not to be duplicated anywhere because of this spirit—speaks better than anything else of these qualities of Dr. Chandler. We do not wonder that the Society of Chemi-



cal Industry, at its recent meeting at Newcastle-on-Tyne, has honored Professor Chandler with the Presidency of that body. As we have already said, we appreciate that it is a great honor to Professor Chandler, but we also recognize that it is an honor for the Society to select such a man as President, who has been esteemed by men of letters, and science and art, as well as by men of large business enterprises of this and other lands, for nearly two generations. We rejoice that his step is as elastic, and his mind as active, and his health apparently as good to-day as ten years ago, when we first had the pleasure of knowing him.

HENRY KRAEMER, '95.

School of Mines of Columbia University.

THE AMERICAN JOURNAL OF PHARMACY

OCTOBER, 1899.

ROBERT BUNSEN.

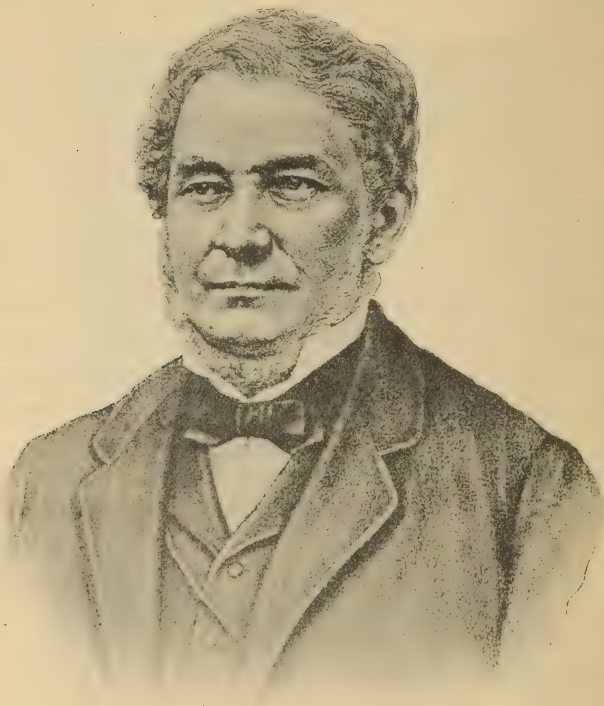
DIED AUGUST 16, 1899.

The death of Prof. Robert Wilhelm Eberhardt Bunsen, at Heidelberg, August 16th, marks the passing away of the last of the great German chemists of the older school. Liebig, Wöhler, Hofmann, Kopp and Fresenius had all preceded him, and now, at the ripe age of 88, Bunsen, known better by name, at least, to every laboratory student throughout the civilized world, has followed them.

Bunsen was born March 31, 1811, at Göttingen, where his father was a professor of Oriental Literature. His special branches of study at the university were chemistry, physics and zoology. After graduation he continued his studies at Paris, Berlin and Vienna, and in 1833 began his career as lecturer on chemistry at Göttingen. He became a professor of chemistry at the Polytechnic School at Cassel in 1836, removing to Marburg in 1838, to Breslau in 1851, and to Heidelberg in 1852, where the remainder of his fruitful life was spent. How fruitful in results his career was to the science of chemistry a brief review of the most important of his discoveries will show.

His first considerable investigation was that upon alkarsin (fuming liquid of Cadet), in 1833 and following years, which resulted in the discovery of cacodyl and the compounds of arsendimethyl, the first of the organo-metallic radicals, as well as the suggestion on his part of ferric hydrate as the most efficient antidote for arsenic poisoning. In 1838 and 1839 he published studies on the composition

of the gases of the blast furnace process, which had the very important result of showing their value for fuel, thus pointing out the means of effecting an enormous saving to the ironmaster, as well as of improving his whole process. Incidentally this opened the way for his later studies on gasometric analysis, which branch of investigation he may be said to have created and brought to the highest perfection.



ROBERT BUNSEN.

In 1840 came the invention of the Bunsen battery cell, replacing the platinum of the Grove cell by the cheaper element, carbon, as well as gaining in electro-motive force. In this connection we may state that the suggestion for the use of acidified bichromate of potash in the one liquid cell is also said to have been made by Bunsen, although the form in current use is known as the Poggendorf cell. With a large battery of the zinc-carbon cells, Bunsen began, in

1844, his studies of the arc light, obtained with different metals volatilized at the electrodes, viewing these colored flames with a prism and noting the characteristic bright lines obtained. This was developed more fully by him in 1859, when, in association with Kirchhoff, he announced the principles of spectrum analysis and invented the spectroscope. Meanwhile he carried out prolonged studies on the electrolytic production of the alkali and alkaline earth metals, obtaining some of them for the first time in a state of purity. In 1861 he announced the discovery of the metals cæsium and rubidium as a result of the application of spectroscopic methods of analysis. One of the special benefits conferred upon a chemical world by this great master was the invention of convenient forms of laboratory apparatus. We need only mention the Bunsen burner, the Bunsen battery cell, the Bunsen filter pump for rapid filtration, the spectroscope, and apparatus for gas analysis.

In person, Bunsen was tall and of a swarthy complexion. He had lost the use of one eye by an explosion in connection with his cacodyl research. Bunsen was never married. When a young professor at Marburg he had joined with a young English chemist, Lyon Playfair (afterwards Lord Playfair), in making an elaborate study of the blast furnace process, and for this purpose the two young chemists spent some months in Scotland, living in the house of a wealthy ironmaster. Both were smitten with the daughter of their host, but she became Mrs. Playfair, so Bunsen went back to Germany single, and so he remained to the end. But he became the centre of a circle of devoted friends at Heidelberg, and so remained during more than a generation of active, fruitful life.

S. P. S.

ASPIRIN, OR ACETYL-SALICYLIC ACID.—Wohlgemuth (*Therap. Monatshefte*, May, 1899) has tested some of the compounds of salicylic acid. By the action of anhydrous acetic acid on salicylic acid he obtained white crystals of acetyl-salicylic acid, readily soluble in alcohol or ether, and to the extent of 1 per cent. in lukewarm water. The drug does not decompose in the stomach until it has been there two or three hours, so that it is, to a great extent, passed into the intestine unchanged, and does not irritate the gastric mucous membrane, as does salicylate of soda, which is decomposed almost as soon as it enters the stomach. The alcoholic solution of the new compound, aspirin, having such a bad taste, the drug was usually given in capsules. Its therapeutic effects are identical with those of salicylic acid, except that disagreeable gastric symptoms are almost entirely done away with.—Abstract in *Medical News*, August 12, 1899.

DIRECTIONS FOR CERTAIN ALKALOIDAL ASSAYS.¹

BY H. M. GORDIN AND A. B. PRESCOTT.

A GENERAL METHOD FOR THE EXTRACTION OF ALKALOIDS IN ASSAYS.

I.—AS A METHOD BY PERCOLATION.²

One to four grammes of the finely powdered drug is weighed into a low wide-mouthed vessel, with a round bottom, holding 8 or 10 ounces, and having a well-fitted cork, such as a screw-top ointment jar.³ The powder is rubbed up with a small pestle to a fine paste, by adding a little of a solvent mixture, composed of stronger ammonia water and alcohol, each 5 c.c., chloroform, 10 c.c., and ether, 20 c.c.⁴ Then a few more cubic centimeters of this mixture are added, so as to have the drug well covered with the liquid, using in all about five times the amount of the drug taken. The vessel is corked, with the pestle inside, and is set aside for about four or five hours, taking care to agitate by circular movement very frequently during that interval. After that time the cover is removed, and the vessel kept in a current of air, stirring frequently till all odor of ammonia has disappeared. With a good draught and frequent stirring, the powder will be almost perfectly dry in about one hour. The vessel is then put into a vacuum desiccator over sulphuric acid for about four or five hours.

¹ In the work of Research Committee D, Section 2, Committee on Revision and Publication of the Pharmacopœia of the United States, 1890-1900. Read at the meeting of the American Pharmaceutical Association, September, 1899.

² These directions were published, nearly as here given, by the authors, in an article, "Emetine Octoiodide," etc., *Pharm. Review*, Vol. 17, 1899. This general method is not applicable to Ipecacuanha. See under "Assay of Ipecacuanha," further on.

³ An ordinary taceup fitted with a specie cork answers well.

⁴ In the case of *Hydrastis canadensis* the chloroform is replaced by an equal volume of ether.

NOTE.—Analytical results in support of these directions were given in an accompanying paper, "Further Work Upon the Estimation of Alkaloids and the Assay of Alkaloidal Drugs," presented to this Association at the same date. Also, in the paper entitled "Certain Alkaloidal Periodides, and the Volumetric Estimation of Alkaloids as Higher Periodides," by the same authors, "*Proc. Am. Phar. Assoc.*," 1898, p. 340; *Pharm. Arch.*, I, p. 121; *Jour. Am. Chem. Soc.*, 1898, p. 724. A paper on "Hydrastine Hexiodide and Assay of Hydrastis," *AM. JOUR. PHARM.*, 1899, p. 257. Further, see the article "The Periodides of the Alkaloids as Molecular Forms for Estimation," etc., by A. B. Prescott, 1897, *Pharm. Review*, Vol. 15, and other papers since 1895.

An amount of powdered sodium chloride,¹ equal to about five or six times the amount of drug employed, is then carefully mixed in, with use of the pestle, and the whole thrown into a small percolator, one provided with a glass stop-cock and having a plug of cotton at the bottom.²

The vessel is then cleaned out several times with small quantities of sodium chloride, and the cleanings added to the percolator. The mixture in the percolator is then covered with a little of the cotton, which is pressed down with a piece of glass, and a suitable menstruum, usually chloroform, is poured slowly into the percolator, till the menstruum reaches the stop-cock. The latter is then closed, the percolator covered and set aside for five or six hours. After that time the stop-cock is opened, and the drug exhausted with the menstruum, percolating until ten drops of the percolate being evaporated on a watch-glass, and the residue taken up with a few drops of acidulated water, the solution shows no turbidity whatever on adding a few drops of the solution of iodine. When finished, the percolate, which is received in a flat evaporating dish, is placed in a good draught at a temperature of about 30° C. When the liquid is reduced to a very small volume, 10 c.c. of acidulated water³ are added, and then a few cubic centimeters of ether, or petroleum ether, so as to have an ethereal liquid cover the aqueous solution,⁴ when the whole is stirred with a glass rod until all the ethereal liquid is driven off. The liquid is then filtered, and the evaporating dish and filter washed several times with acidulated water. In this way is obtained a colorless solution of the alkaloid, which can be worked up for any method of estimation.⁵

¹ In the case of Hydrastis the sodium chloride is replaced by barium nitrate.

² A suitable percolator is easily made out of an ordinary piece of glass tubing fitted with a perforated cork, through which passes a tube having a glass stop-cock.

³ If an alkalimetric assay is intended, the acidulated water in the operation should be closely standardized and taken in definite quantities.

⁴ If the menstruum is all evaporated off it is sometimes difficult to dissolve out the alkaloids with the acidulated water. If chloroform be used, coming below the aqueous layer, it evaporates too slowly.

⁵ The method of extraction described above presents particular advantage in those cases where several alkaloids soluble in different menstrua are present in the drug, as by using these menstrua successively a separation of the alkaloids can be easily effected. This principle we have applied to the assay of opium, and to that of Hydrastis canadensis.

II.—AS A HOT EXTRACTION METHOD.

Instead of the cold percolation, as above directed, hot extraction in any suitable apparatus may be used, all other features of the operation being the same. If a Soxhlet tube is used, care should be taken that the syphon works intermittently, as otherwise the extraction is very incomplete; if Dunstan and Short's apparatus¹ is used, the boiling of the solvent should be so regulated as to have always a layer of about 2 centimeters of it on the top of the drug. Our experience has taught us that for quantitative work cold extraction by percolation requires less skill and care than hot extraction in a Soxhlet tube, though with careful operation the latter method is preferable.

THE VOLUMETRIC ESTIMATION OF ALKALOIDS BY PRECIPITATION WITH FREE IODINE.²

Estimation by Formation of a Periodide, so far Applied to Atropine, Morphine, Strychnine, Brucine, Emetine, Hydrastine and Caffeine.

For opium assay, see p. 466.

For assay of nux vomica, with separation of strychnine from brucine, see p. 470.

For assay of ipecac, see p. 472.

For estimation of berberine in assay of hydrastine, see p. 472.

For estimation of caffeine, the alkaloidal solution must be invariably acidulated (Gomberg, 1896). For assay of kola, see Knox and Prescott, 1896-97, "Proc. Am. Phar. Assoc.," 44, p. 128, and 45, p. 131; *Four. Am. Chem. Soc.*, 19, p. 63; 20, p. 34.

The Reagents and Utensils Required in the Volumetric Work.

(1) A standardized solution of iodine dissolved in water with iodide of potassium to be of about decinormal strength (12.653 grammes of free iodine in 1,000 c.c.). The solution may be made as the volumetric test solution of iodine of the U.S.P., and used with the exact decinormal factor of iodine if preferred.

(2) A solution of sodium thiosulphate, of about decinormal strength, standardized to known ratio with the iodine solution. The

¹ *Pharm. Jour.* (3), xiii, 664.

² These directions were given in substance in an article entitled "Emetine Octoiodide and the Estimation of Alkaloids Generally," by the authors of this paper, in *Jour. Am. Chem. Soc.*, 21, p. 234, March, 1899; *Pharm. Review*, Vol. 17, 1899.

Volumetric Test Solution of Thiosulphate of the U.S.P. may be used.

(3) The Starch Test Solution of the Pharmacopœia.

(4) The burettes and centesimal measuring vessels for any volumetric work in analysis.

THE VOLUMETRIC OPERATION.

The final alkaloidal solution obtained by whatever mode of extraction,¹ but always representing a definite quantity of the drug to be assayed, is poured slowly and with constant stirring into a flask holding 100 c.c., in which has been previously drawn 20 or 30 c.c. of the standardized solution of iodine, and 1 or 2 c.c. of dilute hydrochloric acid² (U.S.P.). The flask is then filled up to 100 c.c., stoppered, and well shaken till the periodide has separated out. The supernatant liquid is to be perfectly transparent, but of a red iodine color. Fifty c.c. are then filtered off, and in this portion the excess of iodine determined by means of standard sodium thiosulphate. The amount of iodine consumed, multiplied by the proper factor, gives the amount of alkaloid present in the quantity of drug taken.³

In case more than one alkaloid be present in the drug, a *mean iodometric* factor can be drawn, as shown for strychnine and brucine in the list of factors. In alkalimetric estimations a mean factor is often used in assay for total alkaloids, and the same is equally justifiable in iodometric work, when the data are known.

Should there be no precipitate with iodine, but only a slight turbidity, then the drug is extremely poor, and for the assay a much larger quantity than has been used should be taken. On the other hand, should the supernatant liquid, after adding the alkaloidal solu-

¹ Directions for extraction are given further on. Other procedure for extraction is given in Lyons' "Handbook of Assaying," 1899, Detroit, Nelson, Baker & Co., pages 26 to 30.

² It is always to be remembered that this estimation, by formation of *higher* periodides, requires the alkaloid to be added slowly to the iodine, with excess of the latter. Except in the case of morphine, an excess of acid is not hurtful, and even promotes the separation of the periodide. Hydrochloric is to be preferred to sulphuric acid.

³ For example: If operating upon 2 grammes of powdered ipecac root, the iodine consumed be 0.957764, then the *percentage* of emetine in the drug equals $0.957764 \times 0.55 \times 100/2 = 2.63$.

tion to the solution of iodine and separating the periodide by shaking, have very little color, or be almost colorless, then it is certain that the drug is very rich, and either a smaller quantity of the drug or a larger quantity of the iodine solution must be employed in the assay.

Generally, if the drug contains as much as 3 per cent. of alkaloid, 1 gramme should be taken for the assay; if it contains less than the above amount, but not less than $\frac{2}{10}$ of 1 per cent. of alkaloid, then a quantity between 1 and 5 grammes should be taken.

THE IODINE FACTORS.

The Precipitate Formed.	Quantity of Alkaloid to 1'0000 of Iodine Consumed.	Quantity of Alkaloid to 1 C.c. of Tenth-normal Solution of Iodine. ¹
Atropine, $C_{17}H_{23}NO_3.HI.I_8$	0'285	0'00361
Morphine, $C_{17}H_{19}NO_3.HI.I_8$	0'749	0'00948
Strychnine, $C_{21}H_{22}N_2O_2.HI.I_8$	0'439	0'00556
Brucine, $C_{23}H_{26}N_2O_4.HI.I_6$	0'518	0'00655
Mean of strychnine and brucine	0'478	0'00605
Emetine, ² $C_{28}H_{40}N_2O_5.HI.I_7$	0'55	0'006
Hydrastine, $C_{21}H_{21}NO_6.HI.I_5$	0'604	0'00764
Caffeine, $C_8H_{10}N_4O_2.HI.I_4$	0'383	0'00485

THE ASSAY OF OPIUM.

*The Extraction of the Morphine and its Volumetric Estimation Either by Standardized Solution of Acid or by Standardized Solution of Iodine.*³

For the use of *hot extraction instead of cold percolation* in treatment of the opium in this process, see the accompanying article,

¹ If the analyst prefers to standardize his volumetric solution of iodine to exact decinormal strength, or to adjust the consumption of iodine to this strength by use of a correcting factor, then he will multiply the cubic centimeters of iodine solution consumed by the proper factor in this column. (1 c.c. decinormal solution contains 0'012653 gramme of iodine.) The more simple way, however, is to register the actual quantity of iodine in 1 c.c. of the solution, be the same above or below the 0'012653 gramme, and multiply this actual quantity by the number of cubic centimeters used up, so as to get the *weight* of iodine consumed. This, multiplied by a factor of the first column above, gives the quantity of alkaloid estimated, in grammes.

² That is, a provisional representative of the total alkaloids of ipecacuanha.

³ This method of assay with the iodometric estimation appeared in its primary form, with the analysis of morphine tetraiodide, etc., in an article by the present authors, in June, 1898 (*Pharm. Archives*, I, p. 121), and with some additions in "Proc. Am. Phar. Assoc.," 1898, p. 340 (also in *J. Am. Chem. Soc.*, 1898, p. 724). The directions with adaptation to the alkalimetric way of estimation, as here given, formed a part of "The Assay of Opium: A Supplementary Note" in the *Pharmaceutical Review*, 17, 1899, and to appear in the *Archiv der Pharmacie*.

"Further Work Upon the Estimation of Alkaloids," in which also are included a few results in comparison with the U.S.P. method, and a brief discussion of the subject.

THE MATERIALS AND UTENSILS FOR THE ASSAY.

Opium in very fine powder. Powdered sodium chloride, such as is used for the table. An ethereo-ammoniacal mixture composed of stronger ammonia water (U.S.P.) and alcohol, of each 5 c.c.; chloroform (U.S.P.), 10 c.c., and ether, 20 c.c. Benzol boiling at about 80° C. A mixture of one volume of absolute alcohol and five volumes of chloroform. Twentieth normal sulphuric acid and twentieth normal potassium hydrate solution. Neutral methyl-orange paper. Standard solution of iodine, of any known strength in the neighborhood of 1 per cent., and standard solution of sodium thiosulphate of about twentieth normal strength.

A four or six ounce screw-top ointment jar, having a bottom concave within. A small pestle, just long enough to rest half upright within the jar when it is closed. A small glass percolator provided with a stop-cock, and of the length of about 22 centimeters and inner diameter of about 1.3 centimeters.¹

DIRECTIONS FOR THE ASSAY.

Weigh out 3 grammes of the opium into the ointment jar, rub it up by means of the pestle with a few cubic centimeters of the ethereo-ammoniacal mixture to make a fine paste, taking care not to smear the sides of the jar unnecessarily, then add about 2 c.c. more of the same mixture, so as to have the opium well covered with liquid, screw down the top, leaving the pestle inside, and set the jar aside for five or six hours. After that time the jar is opened, about 10 grammes of the sodium chloride thoroughly mixed in with the opium, and the open jar placed in a good current of air, stirring frequently with the pestle in order to prevent formation of lumps. In about an hour the powder will be nearly dry. The jar is then placed in a vacuum desiccator containing, besides sulphuric acid, a vessel of paraffin, and left there over night. The jar is then taken out, any lumps in the powder carefully crushed with the pestle, and the mixture transferred first to the glazed paper, and then to the

¹ The lower part of a burette cut in two answers very well.

percolator, in the bottom of which a plug of cotton has been placed. The jar is rubbed out several times with small quantities of the sodium chloride, the rinsings added to the percolator, and, having placed a plug of cotton and a piece of glass on the top of the powder, the opium is extracted with benzol by percolating very slowly, until, upon evaporating ten drops of the percolate on a watch-glass, and taking up the residue with ten or twelve drops of very slightly acidulated water, no turbidity appears by the addition of two drops of the iodine test solution. After the narcotine, thebaine, codeine and most other alkaloids have in this way been completely removed by the benzol, the receiver is taken away¹ and a shallow evaporating dish placed under the percolator.

The percolation is now continued slowly with the mixture of alcohol and chloroform,² until ten drops of the percolate, tested as above, give no reaction for alkaloids. The evaporating dish is now put into a good current of air, and left over night,³ or until the solvent has disappeared. The bottom of the dish will then be found to be covered with a good crop of crystals intermixed with a little resinous matter.

ESTIMATING IN THE ALKALIMETRIC WAY.

Fifty c.c. of the twentieth normal sulphuric acid are now carefully run out from a burette into the evaporating dish, the contents rubbed well with a pestle till everything is detached from the bottom and sides of the dish, and then, without filtering, poured into a tall, narrow measuring cylinder. The dish is then carefully washed several times with small quantities of water, the washings added to the cylinder, and the latter filled up to make 90 c.c. After shaking well a few minutes, and setting aside till solid particles have settled down,⁴ 75 c.c., representing $2\frac{1}{2}$ grammes of the opium, are filtered off into a beaker holding some 250 or 300 c.c., about 50 c.c. of water added, and then 35 or 40 c.c. of the twentieth normal potassium hydrate run out from a burette into the beaker. Twen-

¹ The benzol, of course, can be recovered by distillation, and used over and over again.

² See Burg, *Ztschr. anal. Chem.*, 19, p. 222.

³ This makes the whole assay occupy about two days and two hours, if it be started in the morning.

⁴ The filtration is much accelerated if the waxy particles are prevented from entering the filter.

tieth normal sulphuric acid is now carefully added, 1 c.c. at a time, stirring with a glass rod and testing the liquid after each addition by immersing for about fifteen seconds small strips of neutral methyl-orange paper. As soon as the paper becomes reddish, 1 c.c. of the potassium hydrate solution is added, and then again of the sulphuric acid, adding now $\frac{1}{10}$ of a c.c. of the latter at a time, till the paper becomes reddish. In order to get exact results, the acid and alkali solutions should be standardized in nearly the same conditions under which the titration of morphine takes place, that is, using about 175 c.c. of liquid, and noting the appearance of the reddish tint upon the test paper at the point of neutrality. The strips of reagent paper should, of course, be wet with the wash-bottle before immersion in the beaker. Though the solution of morphine has a yellow color from some extractive matter, so that the end-reaction cannot be found by adding a liquid indicator to the solution, there is not the slightest difficulty in noting the appearance of the reddish tint upon the cream-colored methyl-orange paper. Of course, other indicators, like iodo-eosin in ethereal solution, etc., might be found to give equally good results, but having found the dip test with methyl-orange paper to give sharp and definite results with this alkaloid, we have not experimented upon other indicators.

One c.c. of twentieth normal acid being equivalent to 0.0142 gramme anhydrous morphine, the number of cubic centimeters of the acid consumed by the alkaloid from $2\frac{1}{2}$ grammes opium, multiplied by 0.568 ($= 0.0142, \frac{10.0}{2.5}$), gives the percentage of morphine in the opium.

ESTIMATING IN THE IODOMETRIC WAY.

When it is desirable *to control* the alkalimetric assay with an iodometric one, the contents of the beaker are emptied in a 250 c.c. measuring flask, washing the beaker two or three times with small quantities of water, the flask filled up to 250 c.c., about 3 or 4 grammes calcium hydrate added, and the mixture shaken for about an hour. This treatment removes a good deal of the coloring matter, but keeps the morphine in solution. Fifty c.c., which represent $\frac{1}{2}$ gramme of opium, are now filtered off into a 100 c.c. flask, and the liquid slightly acidified with hydrochloric acid. The liquid will now be only slightly colored. Twenty c.c. of the standard iodine are now run out from a burette into the flask, the latter filled

up to 100 c.c., and the flask well shaken till the supernatant liquid becomes perfectly transparent, but has a dark-red iodine color.¹ Fifty c.c. are now filtered off and the excess of iodine determined by the standard sodium thiosulphate, using starch as indicator. The amount of iodine consumed by the $\frac{1}{2}$ gramme of opium, multiplied by 149.8 ($= 0.749 \times 100 \times 2$),² gives the percentage of morphine in the opium.

If only an iodometric assay be desired, but 1 gramme opium need be taken for the assay, and the latter conducted exactly as described above up to the point where the chloroform-alcohol has been removed by evaporation. At this point the residue is taken up with good lime water by rubbing the evaporating dish thoroughly with it, pouring the mixture in a 100 c.c. flask, filling the latter up with lime water to make 100 c.c., shaking the flask about an hour, filtering off 50 c.c. into another 100 c.c. flask, acidulating and then finishing up as above.

THE ASSAY OF NUX VOMICA.³

The acidulated water solution of the total alkaloids of the drug, as obtained by the directions on page given above, or other method of extraction, is made up to a definite volume, say 100 c.c. If 4 grammes of the drug have been taken, then 25 c.c. will represent 1 gramme of the drug, and will be sufficient for one estimation. This volume, then, is run from a burette into a 100 c.c. flask in which has been placed 20 c.c. of the decinormal iodine solution and 2 c.c. dilute hydrochloric acid, when the amount of iodine consumed by the total alkaloids in that 1 gramme of nux vomica is reached in the way described above. Let that amount be *a*. If only the amount of total alkaloids in the nux vomica is desired, it is sufficient to multiply *a* by 47.8, which is equal to 100 times the mean factor of strychnine and brucine, and the *percentage* of total alkaloids is at once obtained.

For the separate estimation of strychnine and brucine, a modifica-

¹ See our article in *J. Am. Chem. Soc.*, 1898, p. 722; "Proc. Am. Phar. Assoc.," 1898, p. 368.

² 0.75 is here taken instead of 0.74914, which is the factor for morphine (*Loc. cit.*, p. 724).

³ From an article by the authors in *Pharm. Review*, Vol. 17, 1899.

tion of Dunstan and Short's¹ method of separation by ferrocyanide we have found to work fairly well, as follows: Another portion of the alkaloidal solution, representing 2 grammes of the nux vomica, that is, 50 c.c., is run out from the burette into an Erlenmeyer flask of the capacity of about 300 c.c., and to the contents of the flask 10 c.c. of a 2 per cent. solution of sulphuric acid is added, and then water enough to make in all about 200 c.c. Then pour in 25 c.c. of a 5 per cent. solution of potassium ferrocyanide, stopper the flask, and shake continuously for about half an hour. Now filter, wash the precipitate on the filter repeatedly with water containing 1 per cent. of sulphuric acid till a few drops of the filtrate diluted with a little water have no bitter taste. The filter is then pierced, and the precipitate rinsed with use of the wash-bottle into a 100 c.c. flask. To the contents of the flask are then added 20 c.c. of a 5 per cent. solution of zinc sulphate, and the flask kept on a boiling water-bath for about fifteen minutes. The zinc sulphate decomposes the strychnine ferrocyanide, zinc ferrocyanide is precipitated, and strychnine sulphate remains in solution. The flask is then completely cooled, and water enough added to make 100 c.c. Of this, 50 c.c., representing again 1 gramme of the nux vomica, but deprived of the brucine, are then filtered off and run out from the burette into a 100 c.c. flask containing 20 c.c. decinormal iodine solution and about 2 c.c. of dilute hydrochloric acid. The amount of iodine consumed by the strychnine alone is then determined as above. Let it be b . Then $b \times 43.9$ (100 times the strychnine factor) gives the percentage of strychnine, and $(a - b) \times 51.8$ is the percentage of brucine in the nux vomica.²

	Iodine Consumed by 10 C.c. before the Removal of Brucine.	Iodine Consumed by 10 C.c. after the Removal of Brucine.	Found.		Contained.	
			Strych- nine.	Bru- cine.	Strych- nine.	Bru- cine.
1	0.0843132	0.032397	0.14	0.24	0.16	0.22
2	0.0843130	0.032397	0.14	0.24	0.16	0.22

¹ *Pharm. J. Trans.* (3), 14, 290; *AM. J. PHARM.*, 1883, 579. Any other method of separation of strychnine and brucine may be used with the iodometric estimations.

² To test the exactness of this method, we prepared a solution containing known quantities of each of these alkaloids, and determined the same by the described method. The results, as can be seen from the following statement, are fairly satisfactory, if we consider the well-known difficulties of this separation. The solution contained 0.16 per cent. strychnine and 0.22 per cent. brucine (anhydrous).

ASSAY OF IPECACUANHA.

For extraction of the drug, use one of the methods given in Lyons' "Assaying."¹ The cold percolation process of extraction previously directed, as already remarked, does not work well with this drug.²

In iodometric estimation the total acidulated alkaloid solution is made up to a definite volume, an aliquot portion taken, and added to a measured excess of the iodine solution, as directed heretofore. The iodine factor of emetine is taken as fairly near the mean factor of the total alkaloids.

ASSAY OF HYDRASTIS.

In the assay of *Hydrastis canadensis*, for berberine and for hydrastine, the directions for the assays are given in the accompanying article entitled "Further Work Upon the Estimation of Alkaloids," etc. In the plan of the assay the hydrastine is dissolved with absolute ether, and estimated iodometrically as a hexiodide. The berberine, undissolved by the absolute ether, is estimated volumetrically by precipitation as berberine hydriodide, the excess of the precipitant, potassium iodide, being determined by silver nitrate with sulphocyanate. But before the berberine is precipitated as hydriodide, it is separated in its acetone compound. And before the alkaloids are acted upon by the reagents, they are liberated from the powdered drug by maceration with an ethereo-ammoniacal mixture.

THE DESTRUCTION OF MOSQUITOES WITH KEROSENE.—An interesting experiment, confirmatory of the efficacy of the plan proposed by Mr. Howard, of the United States Department of Agriculture, for exterminating those vexatious vehicles of malaria, mosquitoes, was recently made in England, as we learn from the *British Medical Journal* for July 8th. Five drops of kerosene, added to a bucket of water estimated to contain between four and five hundred larvæ, killed them all within an hour, and a teaspoonful killed, within a few hours, the many thousands contained in the water of a tank of nearly three hundred cubic feet capacity.—*New York Medical Journal*.

¹ Detroit, 1899.

² Ether, chloroform and acetone were tried as menstrua in the cold percolation, but the results were too low. The ammoniated mixture fails to yield all the alkaloid. This possibly explains why Flückiger,* extracting by ammoniated chloroform, obtained exceptionally low results. See also Guareschi, "Alkaloide," 1896, p. 527.

**Pharm. Zeitung*, 1886, p. 30.

IS PHYSIOLOGICAL ACTION REQUISITE AS A DEPARTMENT OF PHARMACEUTICAL RESEARCH?¹

By E. M. HOUGHTON, Ph.C., M.D.

If by the query, as propounded by the Committee on Scientific Papers, it is intended to express the idea that in order to accomplish results of the greatest value to the pharmaceutical and medical professions and to humanity at large, through the manufacture of better and more uniform pharmaceutical products from old and tried drugs, through the improvement of processes for the isolation of active constituents, or through the exhaustive investigation of the action of new medicinal substances, by the employment of physiologic methods in addition to the methods usually employed in pharmaceutical research, I desire to offer the following views, some of which were expressed several years ago. (*The Journal of Am. Med. Assoc.*, April 3, 1897.)

In the practice of medicine it is of paramount importance that the remedies prescribed shall exhibit their special pharmacologic properties, and that such action shall be as nearly uniform as possible; otherwise, the greatest harm may result to the patient through valuable time lost or improper dosage. One of the most humiliating charges against the science of medicine is the one so frequently voiced that "the application of drugs in the treatment of disease is, at best, uncertain and unscientific." It is because the great imperfections in the present methods of treating disease are realized by scientific men that such great efforts are being put forth throughout the civilized world, by the application of every conceivable method, to improve pharmaceuticals and to discover the relations that exist between the physiologic action of the body in its normal condition (physiology) and the changes in function of the various organs manifested when under the influence of drugs (pharmacology), or when modified by the products or processes of disease (pathology), in order that medicinal agents may be applied with the greatest certainty of effect. As a direct result of these efforts, and especially because of the application of laboratory methods, the progress of pharmacy and medicine has been greater during the last twenty-five years than in the entire century preceding.

¹ Read before the American Pharmaceutical Association, at Put-in-Bay, September 6, 1899.

Chemical methods should always be employed in preference to animal experiments where possible; but there is a large class of drugs containing active constituents about which little is known, or which are of such a delicate nature that decomposition results when they are subjected to chemical manipulations, consequently it is impossible to standardize them by ordinary means. I refer to Indian cannabis, ergot, and especially to the heart tonics of the digitalis group, etc. No directions are given in the U.S.P. for the assay of these substances, yet the most poisonous drugs employed in therapeutics belong to the digitalis series. As given by several of the best authorities, the maximum dose of belladonna is twice as great as that of digitalis, while ten times as much absolute HCN can be given with safety as of strophanthin.

Brunton found, by experiments upon animals, that amyl nitrite dilates the arterioles and lowers blood pressure, and recommended the drug in angina pectoris. His recommendation, as is well known, has been confirmed by abundant clinical experience. Through the exhaustive researches of Schmiedeberg and others, the rational application of digitalis and the rest of the heart tonics has been rendered possible.

We must give the biological laboratory entire credit for explaining the cause of the infectious diseases, and for the revelation of nature's remedy and the perfection of processes for manufacturing the antitoxins. This is the most important discovery in medicine ever made, and bids fair to revolutionize the treatment of many diseases that have heretofore defied the power of all drugs. It is not my purpose, however, to speak at length of the relation of the pharmacist to the antitoxins, as my time is too short, but it seems to me that more attention should be paid by pharmacists to these products, which are so rapidly supplanting older remedies.

Too often, in the manufacture of pharmaceuticals, physiologic activity has been sacrificed to enhance the elegance or lessen the cost of the preparation. Podwissotsky and Dragendorff concluded from insufficient experimental data that sclerotinic acid was the most desirable constituent of ergot, and, since it is readily soluble in water, numerous manufacturers made aqueous preparations of the drug. After several years of pharmacologic study of ergot, I am satisfied that Kobert, Jacobi, etc., are right in their conclusion that sclerotinic acid as an oxytocic is worthless; large doses of it

and of certain preparations of ergot, made with an aqueous menstruum, and therefore containing it, may be administered to pregnant animals without producing abortion, or to fowls without producing blackening or gangrene of the comb or other peripheral parts. It is a well-established fact that ergot may become quickly inert if improperly cured or stored. Indeed, if physiologic examination be made of the supplies of ergot offered for sale on the market, it will be found that a large proportion are comparatively inert.

Pharmacologic experiments are of special importance in the isolation of active glucosides. "Several years ago there was isolated a beautiful white scillein, which was supposed to be the active constituent of squill. But since then it has been found to be entirely inert, and that the really important constituent of squill is a brown resin-like substance, possessing in a very marked degree the characteristic action of the digitalis group."

The various samples of strophanthin, digitalin, and other glucosides found on the market vary greatly in strength; indeed, so considerable is the discrepancy that the employment of these drugs in tablets by weight may become decidedly dangerous. Of three samples of supposedly C.P. strophanthin which I tested in 1897 and reported in *The Journal of the American Medical Association*, "there was found such wide variation in activity that one was ninety times as fatal to animals as another. The strength of the remaining two varied between the above limits. No two samples were even approximately the same in strength. What a chance for a sudden fatal termination of an apparently improving heart case!"

It is a well-known fact that the supplies of crude Indian cannabis, strophanthus seeds, etc., shipped to this country may possess full activity or be almost inert, resulting, consequently, in much variation in the finished products. From personal observation in testing several hundred samples of crude hemp, I find that at least 60 per cent. of the drug obtainable should be condemned. Is it any wonder that physicians have come to believe that cannabis is the most unreliable of drugs? I have frequently found one tincture of strophanthus three times as active as another. Verily the practitioner's path is full of pitfalls when he attempts to prescribe drugs of this class!

By physiologic methods, since many of these drugs have an almost specific action on certain organs of the animal body, it is

a comparatively easy matter to standardize the crude drug, pharmaceutical preparations or active constituents before they are placed on the market in the form of fluid extract, pills, tablets, etc., and thus avoid unnecessary danger to patients. I believe the time will come when the attitude of physicians will be such that manufacturers of these medicines will be compelled to purchase physiologically assayed drugs or assay their finished products by physiologic means.

Synthetic chemistry has made such rapid progress during the past few years that scarcely a day passes without our attention being called to some new antiseptic, antipyretic, hypnotic, etc. I believe the introduction of these substances will result in great benefit to the entire profession of medicine, but before a new product is employed for clinical purposes its physiologic action should be carefully studied in the laboratory. Not until the functional changes produced by the drug on each individual organ have been worked out as thoroughly as possible can a rational application of the remedy be made.

"The examination of medicinal plants for active constituents is greatly facilitated by physiologic testing of the residues obtained by chemic manipulations;" as we are unable to say whether a substance crystallizing in an alcohol extract of a plant is the active constituent of that plant, or whether the amorphous substance dissolved by ether is the principle sought, we can tell by physiologic methods when we have a substance representing the activities of the crude drug, whether it be crystalline or amorphous—which is the fact of real importance to the physician.

"Heretofore it has been the custom of manufacturing houses, when dealing with a new plant believed to possess medicinal properties of value, to make a fluid extract or some other preparation of the crude drug, and send it out to clinicians, at great expense, in the hope that it might prove of value. How much better it is to have the physiologic properties of the plant examined at the outset. If found to be inactive, the drug may be rejected, thus saving a large item of expense to the manufacturer and much disappointment to the physician and his patient; while if the plant is of value and the physician knows what its effects are on the various organs of the body, he can use it intelligently, with a good prospect of success. Then, too, human beings are not so recklessly experi-

mented upon, the lives of a few animals being jeopardized in place of so many patients. We can never analyze the action of a drug on the various organs of the human body with such precision as we can on the lower animals, but clinical knowledge obtained after we have a right conception of the physiologic action of the agent used is of very great importance in determining the value of a given remedy." (*Four. Am. Med. Assoc.*, April 3, 1897.)

Until recently most of the work in experimental pharmacology has been carried out in Europe. A few of the better universities of America have equipped laboratories for the investigation of the physiologic action of drugs and for purposes of instruction. No American or foreign educational institution, so far as I am aware, has given attention to the qualitative or quantitative assay of drugs by physiologic methods, notwithstanding the vast amount of valuable research work they have accomplished.

It seemed to me, five years ago, when considering the advisability of establishing a pharmacologic laboratory in connection with a manufacturing plant, that an extremely important field of work was being neglected, and that by careful and painstaking study methods could be devised whereby the danger of prescribing powerful remedies unamenable to chemical assay could be avoided. Such work requires much time and ample laboratory facilities, but success can be accomplished, as evidenced by the fact that all the diphtheria antitoxin on the market is standardized by experiments on animals. Other illustrations might be cited if time permitted.

In conclusion, I believe that advances may be made in pharmacy by the application of physiologic methods, since such methods, when employed in connection with chemical manipulations, enable us to standardize potent drugs not amenable to chemical assay, improve processes of pharmaceutical manufacture, aid in the isolation of active constituents, help to a clearer knowledge of the action of drugs long employed in practice, and promote the advancement of medical science, by furnishing exact knowledge as to the action of new substances before they are employed clinically, and thereby serve the cause of humanity.

CARBOLIC ACID POISONING.—J. C. Bucher attributes the recovery of a young man, aged 18, who swallowed two ounces of carbolic acid to the full stomach of the young man and the use of the tube and nitro-glycerin hypodermically.—*Phila. Med. Jour.*

A SUBSTITUTE FOR POULTICES.

BY M. I. WILBERT, PH.G., Apothecary to the German Hospital.

As an improvement on, and a general substitute for, poultices, a mixture of kaolin and glycerin has been placed on the market, within the last three or four years, and extensively advertised, especially in the western part of the United States, under the trade-marked name "*Antiphlogistine*;" lately an evident imitation is being brought forward and advertised as "*Antithermaline*," at a slight reduction in price.

From an observation of the cases treated in a general dispensary, as well as from reports of physicians who have used the preparation, it would seem that the claims made by the manufacturers of the trade-marked article are not at all unreasonable, and that this mass or mixture will prove to be a very important and most valuable addition to our stock of remedies for local application.

It may be used in all cases where a poultice is indicated, and has the advantages of being readily applied without boiling or other preparation, of not requiring renewal for from twelve to forty-eight hours, according to the nature of the inflammation or injury, and of giving almost immediate relief from pain in most cases of acute or sub-acute inflammation or congestion. As a substitute for many ointments and cerates it has the advantage of not being greasy or dirty, it being readily washed off with cold water. It can readily be combined with many drugs, such as iodine, the various iodides, iodoform, tar, ichthyol and many others used in the local treatment of disease.

The manufacturers of the trade-marked article usually give quite an elaborate formula among the advertising matter supplied with each can; this formula, while practically correct, is slightly misleading, the first and last article of the formula being the component parts of the mass, as well as its active ingredients. To get a working formula for the mass, 25 grammes of *antiphlogistine* was taken and mixed with 200 c.c. of distilled water. This mixture was transferred to a wetted filter and allowed to drain, the mass on the filter then thoroughly washed with distilled water, the residue dried at a temperature of about 80° C., when the dry powder was found to weigh 12.3 grammes. The filtrate from the original mixture was perfectly clear and tasted aromatic and sweet, showing that the

antiseptic, aromatic oils that play an important part in the published formula, were in reality only added as flavoring ingredients.

From the information thus obtained, the following formula was adopted.

Kaolin	I,000
Glycerin	I,000
Boracic acid	100
Oil of peppermint	I
Oil of wintergreen	I
Oil of eucalyptus	2

Pass the kaolin through a No. 60 sieve to free it from sticks and coarse particles and heat to 100° C. for an hour or more to sterilize; add the glycerin and continue the heat for thirty or forty minutes, stirring the mass occasionally with a spatula, until a smooth creamy mass is obtained; remove the heat and, when nearly cool, add the boracic acid and flavoring oils; mix thoroughly, and preserve in tin or glass boxes that are fairly tight, so as to prevent the absorption of moisture from the atmosphere. The resulting product will differ slightly in color owing to a slight difference in the constituents of the kaolin, the kaolin sold in Philadelphia not containing any iron, while a lot that was obtained through a New York house did contain a trace of iron. This, however, does not affect the efficiency of the product in any way.

SOME NOTES ON CHONDRUS.¹

BY HENRY KRAEMER.

In this paper I desire to treat of some of the morphological characters of chondrus, its collection, as carried out on the Massachusetts coast, and some reasons for the modification of the definition of the U.S.P. concerning this drug. Chondrus belongs to what we ordinarily consider to be a low order of plants, viz.: one of the algæ—a subdivision of the cryptogams. The number of algæ, like that of fungi, is continually increasing either because more forms are being observed or because new forms are being made with the progress of time.

The algæ are divided according to whether they live in fresh water or salt water, and according to the color they possess. By the latter division we have green algæ, blue-green algæ, brown algæ and red algæ. In only one of these divisions do we have algæ in

¹ Presented at the meeting of the Pennsylvania Pharmaceutical Association, June, 1899.

which the green color is manifest ; in all the others it is hidden by means of other coloring substances, to which are given the various names "blue-green," "brown" and "red." The blue-green algæ are generally found in moist soil near fresh water, seldom do they occur in salt water. The green algæ represent a rather ubiquitous group that may be said to be found anywhere where the conditions for CO_2 assimilation are present. The brown algæ, represented by *Fucus*, *Laminaria*, *Sargassum*, etc., reach their greatest perfection in the colder waters, as north of Cape Cod and the English channel. The red algæ attain their greatest perfection in the deeper waters.

The outer morphology of the algæ appears to be rather simple. They may consist of a single row of cells placed end to end and forming thread-like masses, as *Lyngbya* (called mermaid hair), or cord-like masses, as in *Chorda*. In some cases the thread-like filaments may branch as in *Griffithsia*. The same may be said of some of the algæ which are made up of a large number of cells placed side by side, as *Ceramium*, *Dasya*. In some cases the thallus is flattened, as in *Chondrus*, *Laminaria*, *Rhodymenia*. In some cases the parts of the plant are differentiated to such an extent that there is developed what looks like root ("hold-fast"), stem ("stipe") and leaf ("blade"), as in *Laminaria*. In some cases there are incrustations of calcium carbonate produced, as in *Melobesia*, *Corallina*.

In regard to manner of reproduction in the algæ we have a number of distinct kinds of sexual and non-sexual reproduction. It is not fitting that I take up these different forms at this time. In the sexual mode of reproduction we have essentially three kinds: (1) The conjugation of two cells that look essentially alike; (2) the conjugation of two cells that may be distinguished one from the other, and to which the terms male and female are applied, and (3) the remarkable condition such as we find in the red algæ, as in *Chondrus*, *Gigartina* and some others in particular, and which will be briefly described presently.

In its general outer morphology *Chondrus crispus* (L.), Stack., consists of more or less purplish colored fronds, which are from 2 to 4 inches long, dichotomous, flat, the segments being linear-cuneate. It is attached to the rocks by a slender hold-fast, and has not infrequently been found growing upon various forms of marine life. On making a transverse section, we observe a more or less differentiated

epidermis, which may be distinguished from the remaining thick-walled cells. The fruit is known as a cystocarp, a term applied to the zygote or zygospore of the Florideæ. The development of the zygospores in chondrus is a rather interesting one as described by Schmitz.¹ Briefly stated, it is as follows: From one of the cells in the tissues of the thallus there is produced a three-celled branch which bends and almost touches the "Tragzelle." The end cell of the three becomes what is known as the carpogone cell, and develops a trichogyne, which protrudes from the thallus tissue. The Tragzelle becomes the "Auxillarzelle."

The nucleus of the spermatia unites with the nucleus of the carposporic or egg cell, and subsequently a division wall is formed between the trichogyne and egg cell. The egg cell then unites with the auxiliary cell, and from the latter there arise numerous thread-like processes which unite with some of the cells of the thallus. It is from this latter union that there is then developed a complex of four cells, which gives rise to the naked carpospores. In other words, we have here what may be termed a triple conjugation, and, in view of this condition, may we not then well ask what is fertilization? Is a certain quantity of matter required before an egg may develop its progeny, or does it mean that a certain amount of stimulation is necessary?

This brings me to say a word on the industrial side of the seaweeds. In the Old World the collecting and working up of seaweeds yields financial returns upon which a large number of people of a great many of the smaller towns are wholly dependent. In this country all along the coast one observes that seaweeds are to some extent collected and utilized as a fertilizer, but besides this use of seaweeds there is an industry of great importance to the inhabitants of a number of smaller towns between Plymouth and Cohasset on the Massachusetts coast. It is the collection of Irish moss.

The situation at Scituate is particularly good for this purpose. You find here an inlet with a fine beach, on either side of which extend rocky promontories, on the submerged rocks of which the Irish moss is found.

¹Untersuchung über die Befruchtung der Florideen, in Sitzungsberichten den Königl. Akad. der Wissenschaft zu Berlin, 1883.

The beach extends probably 20 feet above high tide, at the top of which the frame houses are placed; back of this there is a gradual decline to the brackish salt marshes.

The moss is collected between the latter part of May to September. June and July are the months when the greatest amount of collecting is done. The collectors frequently work during these two months from four in the morning till eight at night.

The women used to be the great helping hands in gathering moss, but fortunately for them the moss is only found on those portions of the rocks that are from 15 to 20 feet below the tide, and the only way that moss can be collected to-day is by the use of long spruce poles to which is attached a heavy iron rake.

The men go out in their sail boats or dories (row boats) at half-tide, and come in at half-flood. With their long rakes they scrape the moss off the rocks. The amount collected varies with the season, but the quantity usually gathered is about 50 pounds.

The men return with boats and cast anchor until the tide is high, when they row out and bring their dories to the highest point on the beach, thus saving considerable energy.

They then carry the moss from the boats to points higher on the beach in boxes about 2 feet square, and made of lathes. These are practically suitable trays, so that two men can handle them.

The moss is spread out on the beach and exposed to the weather for a week or so. The action of the sun and dews is to bleach the moss.

The product is turned over every few days, and at the end of a week is of a light purplish-yellow color.

It is then put into half hogsheads and covered with canvas. On clear days they roll the half hogsheads containing the moss to the brackish marshes and fill the hogsheads containing the moss with salt water. The canvas is again put on and the half hogsheads rolled up on the beach and the moss uniformly spread out on the beach to dry to be further bleached. The salt water seems to preserve the moss, as well as assist in the bleaching action of the sun.

This is then raked over, the women assisting, until dry, and the treatment repeated four or five times until the moss is of a light yellowish or white color. The more favorable the weather has been and the more successful the treatment the whiter is the product.

When fully prepared, the moss is put into barns, and in the fall is

packed in barrels, each of which holds about 100 pounds. It is estimated that about 10,000 pounds are gathered at Scituate, and that they realize about 5 cents per pound.

When making some studies on *Chondrus* at the Marine Biological Station at Wood's Holl, the writer was told that *Gigartina mamillosa* grew only further north. A little later I journeyed north to the fields where *Chondrus* was gathered, and I was much impressed with the fact that all of the Irish moss that was collected was really *Chondrus crispus* (L.), Stack. chiefly, if not entirely. I subsequently obtained specimens of *Gigartina mamillosa*, Ag., from Nahant, Mass. On turning to Dr. Farlow's "The Marine Algæ of New England," I find that he says that *Gigartina mamillosa*, Ag., resembles and grows usually with *Chondrus crispus* (L.), Stack., but that it is common from Boston northward. I have examined the collections of those who gather moss on the Massachusetts coast, as well as that in the shops, and am inclined to believe that the *Chondrus* sold is chiefly, if not entirely, *Chondrus crispus* (L.), Stack.

RECENT LITERATURE RELATING TO PHARMACY.

LAURO TETANIN.

J. D. Filippo publishes (*Arch. de Pharm.*, 1898, 601) a painstaking dissertation on the above-mentioned alkaloid found in the bark of *Tetranthera citrata*, Nees, and in other plants of the N. O. Lauraceæ. After describing plant and process of extraction of alkaloid, which is performed by dissolving an aceto-alcoholic extract of the drug in water containing acetic acid, clearing of this solution with lead acetate, making the filtrate alkaline with sodium carbonate and extraction of freed alkaloid by agitation, he reports on the chemical characteristics of the alkaloid, which was first isolated and named by Greshoff in 1890.

The substance, present in the bark just mentioned, in quantities of 0.2 per cent. to 0.4 per cent. melts at about 134° C., blues litmus paper and is feebly basic. It changes color with most of the alkaloidal reagents, the most sensitive ($\frac{1}{60,000}$) being the precipitate with Lugol's solution. Elemental analysis showed its composition as $C_{19}H_{23}NO_5$, which was confirmed by molecular weight estimations. It forms double salts with the chlorides of gold, platinum, zinc and

cadmium, as well as the usual salts, many of which were prepared and analyzed.

As preliminary in establishing structural formula, the writer prepared with ethyl iodide a crystalline product $C_{19}H_{22}C_2H_5NO_5HI$, from which the hydriodic acid was separated by sodium carbonate, additional ethyl groups were not taken up showing it to be a secondary amine. Further proof of this was shown by the phenyl thiourea product $CSNHC_6H_5 NC_{19}H_{22}NO_5$, formed when the alkaloid was treated with phenyl-mustard oil. The body gave no reactions of aldehyde or ketone, but did respond to Zeisel's test for the methoxyl group (OCH_3), showing three such groups. Finally, treatment with benzoyl chloride yielded a derivative containing two benzoyl groups, showing presence of two hydroxyls. This data indicates as formula of lauro-tetanin $C_{16}H_{11} (OCH_3)_3 (OH)_2 NH$, which disproves Greshoff's idea that it was identical with berberine. The writer investigated the physiological action of the alkaloid, which is as suggested by name.

H. V. ARNY.

ESTIMATION OF DENSITY OF POWDERS.

M. Vandevyver (*Ann. d. Chimie Analytique*, 1899, 3) describes an apparatus for estimation of specific gravity of powders, which has the advantage of leaving the substance intact. It consists of a flask of known weight and capacity, provided with a three-way stop-cock and a manometer, consisting of two glass tubes connected by rubber tubing. The method of estimation is a clever application of Mariott's law—manometric readings being taken before and after the weighed powder is placed in the flask, and from data thus obtained an equation is evolved. Details are useless unless accompanied by cut of apparatus, hence the reader is referred to original article.

H. V. A.

PREPARATION OF STANDARD SULPHURIC ACID SOLUTIONS.

Arthur Marshall, in the *Four. Soc. Chem. Ind.*, 18, 4 (1899), gives a brief résumé of some of the methods proposed for making such solutions, and shows that all of them involve a number of operations, each of which is liable to introduce more or less error. He comes to the conclusion that by far the most accurate and rapid results can be obtained by basing standardizations on the very accurate densities of sulphuric acid, made by S. U. Pickering, in 1890,

Four. Chem. Soc., 57, 64. According to this procedure, all that is necessary is to accurately determine the specific gravity of the pure sulphuric acid, at a definite temperature, preferably at 15 or 18° C., for tables are given in the original communication, which give the per cent. of acid, of certain densities, at these temperatures. Formulas are also given to make certain calculations. Experiments were also made to show that the ordinary C. P. acid was sufficiently pure to prepare accurate solutions from it.

L. F. KEBLER.

LITHIUM-AMMONIUM AND CALCIUM-AMMONIUM.

These compounds were prepared by H. Moissan, the former by passing a current of dry ammonia gas through a U-tube, containing the metal, lithium, at the ordinary temperature and pressure. The calcium-ammonium was prepared by the same procedure, except that the temperature was not allowed to rise above 20° C. These compounds have the composition represented by the formulas LiNH_3 and $\text{Ca}(\text{NH}_3)_4$, respectively.—*Comp. rend.*, 127, 685.

L. F. K.

LIME AS A PRESERVATIVE OF CHLOROFORM.

D. Newman and Ramsay (*Lancet*, Jan. 23, 1897) recommended the use of lime for purifying and preserving chloroform. On the strength of this D. Brown made some experiments, and found that lime was not only not efficient as a preservative of chloroform, but, on the contrary, hastened its decomposition. Chloroform having a specific gravity of 1.500, when mixed with slacked lime showed marked decomposition, after two days' exposure to sunlight. Chloroform, whose specific gravity was reduced to 1.497 with alcohol, to which slacked lime was added, showed decomposition after similar exposure for five days, while the same chloroform, without the lime, did not exhibit any decomposition, even after several weeks' exposure.—1898, *Pharm. Four.*, 61, 669.

L. F. K.

CONCERNING COLOPHONY.

As a result of careful examination of rosin, R. Schick (*Ap. Zt.*, 1899, 43, from *Ztschr. f. angew. Chem.*, 1899) takes exception to Dieterich's statement that it consists chiefly of abietinic anhydride. His results in the estimation of the acid and saponification numbers

of the samples examined led him to the conclusion that the main ingredient is an ester, which is saponified by the alcoholic potassa used in the above process. He also finds that no definite iodine absorption number can be obtained, but he thinks that the index of refraction of a 20 per cent. solution in linseed oil may prove of analytical value.

H. V. A.

A NEW METHOD FOR ESTIMATING FORMALDEHYDE.

O. Blank and H. Finkenbeiner, *Ber. d. Deut. chem. Ges.*, 1898, 31, 2979, state that the ammonia process for estimating formaldehyde gives lower results than several of the other technical methods that agree well among themselves. They offer a new method, which gives very good results. It consists in oxidizing the formaldehyde, in a definite amount of standardized alkaline solution, to formic acid, by means of hydrogen peroxide, and then estimating the amount of caustic not neutralized. The method is as follows: place 3 grammes of solution or 1 gramme of solid formaldehyde into a tall Erlenmeyer flask, containing from 25 to 30 c. c. of double normal caustic soda solution; then add gradually, during three minutes, 50 c. c. of 2.5 to 3 per cent. of pure hydrogen peroxide, through a funnel placed in the neck of the flask. Allow to stand two or three minutes, then estimate the amount of unused alkali, with double normal sulphuric acid, using litmus as indicator. Solutions containing less than 30 per cent. of formaldehyde must be allowed to stand not less than ten minutes, after the hydrogen peroxide has been added, so that complete oxidation will result. The per cent. of formaldehyde is found by multiplying the number of cubic centimeters of alkaline solution used, by two, if 3 grammes of substance are taken, and by six when 1 gramme is employed.

The presence of acetaldehyde, paraldehyde or benzaldehyde is liable to vitiate the results.

L. F. K.

STABILITY OF OXALIC ACID SOLUTIONS.

W. P. Jorissen, *Maandbl. natuurw.*, 22, 100; from *Chem. Centrbl.* (1898), 1084. Oxalic acid solutions, in the presence of light, are decomposed by oxygen, but in the dark the solutions are stable, except that they may be decomposed by fungi. Two to three per cent. solutions are poisonous to mould fungi. Alcoholic oxalic acid solutions diminish in strength even in the dark; this is probably due to the formation of esters.

L. F. K.

EDITORIAL.

FAIRS AND EXPOSITIONS.

The word fair is derived either from the Latin *forum*, a market-place, or *feriæ*, holidays. Fairs were originally meetings of buyers, and sellers with their merchandise, either at stated times (on holidays) or at fixed places (markets) for purposes of trade. Fairs, however, were not wholly given over to business, but contained certain departments for amusement and relaxation. It is supposed by some that fairs were an outcome or offshoot of the feast days of the church. It is, however, likely that the latter borrowed the term from the Romans, and that "fairs are probably coeval with commerce itself, since, especially before the era of railways and steamboats, some rallying point of the kind was necessary for the interchange of commodities. Such commercial gatherings were known in most of the states of antiquity, especially in the provinces of Rome."

The fairs of Germany, Russia, France, Turkey, India and England may be said to have been among the great educational institutions up to within the last century. To these gatherings were brought not only the merchants and financiers of all lands, but here were also to be found skilled mechanics and students of every kind. Here was a common meeting place for the interchange of thought as well as products of skill. Here were opportunities for wider visions and an examination into the resources of the minds of all nations, as well as the resources of the natural conditions of these countries and acquired skill of their workmen. These fairs cherished and preserved an international spirit in thought and commerce and wrought a gradual change upon all the labors of the minds and hands of all the nations that were represented.

It was but natural, with the construction of roads and canals and the development of commerce, that the main features of the fairs were made subsidiary to the social features and amusements, and they came to be regarded in the nature of festivals and were made holidays. Fairs, particularly in England and France, came to be more or less of the nature of "shows," or a kind of circus, and, as a result, in these countries they have, it is said, almost entirely disappeared or given way to markets for specialties. The fairs which are still continued in Europe and considered to be of greatest importance, are those held three times a year in Leipzig. The Easter "Messe" (or fair) at Leipzig is considered the most important, and still brings thither people from nearly all parts of Europe. The fairs at Nijni-Novgorod are also famous, attracting the merchants of Europe and Asia. The largest fairs probably of modern times, bringing together the largest number of people and merchandise of greatest value, are those held at Hurdwar, on the Ganges.

According to the historian Prescott, we find that on this continent fairs were held in the principal cities of Mexico. In the United States the term fair is used to include a variety of exhibitions, which are either in the nature of competitive exhibitions or festivals for charitable purposes. The agricultural fairs, so popular in the United States, were originated by E. Watson, who induced the New York Legislature to appropriate \$10,000 for six years, to be expended for premiums on agricultural products and manufactures. Besides State fairs, it has been estimated that nearly one-half of the counties give annual fairs. Besides these agricultural fairs, there have been other exhibitions, as those

of the American Institute, the Franklin Institute, the Maryland Institute, etc.

The term fair is ordinarily associated in this country with agricultural or mercantile interests. While originally applied to a gathering of buyers or sellers at a particular place and a particular time with their merchandise for purposes of barter and trade, the term fair is now applied to either festivals where fancy articles are sold, usually for some charitable purpose, or it is applied to exhibitions of agricultural products, which are not primarily intended for purposes of sale, but for competitive show, where those having the best exhibits receive prizes, etc. From these competitive agricultural fairs have sprung the more specialized "shows," which are given solely for the exhibition of some one product (as chrysanthemums) or animals (as poultry, horses, etc.).

Expositions are distinguished from fairs in that they are public exhibitions of industrial or artistic productions. They may be looked upon in one sense as more refined or cultured fairs, which have resulted with the progress of civilization and the increased products of man's handiwork. The Centennial Exhibition held in Philadelphia in 1876 was, up to 1892, probably the greatest exposition held in this country. The World's Columbian Exposition, held in Chicago in 1892, while a magnificent show to the "sightseer" and of general interest to every one, was not the kind of an exposition that the student attended with profit. (See this JOURNAL, 1894, p. 80). Attention was called in that article to the fact that the expositions of the future, to have the greatest value, must be of a more specific character. They must serve rather to bring together in certain departments those results which will take the place in a certain measure of long travels and extended residences in different parts of the world. The expositions of the future will tend to become more and more in the nature of post-graduate schools for the "journeymen" of each trade or profession. The trend of modern training in every pursuit in which there is a livelihood to be made is to replace the personal investigation by such rapid methods of education. In the National Export Exposition, now being held in Philadelphia, we find such an institution, which has been called by Hon. Wm. P. Hepburn a "University of Commerce." In speaking of this Exposition, Mr. Hepburn, in his oration at the opening, said:

"It is grand and beneficent in its designs; it is comprehensive in the vast possibilities of its teachings. Here comes one of its inquiring students. He wants to engage in a commercial venture, or he wants to employ some idle manufacturing plant in making things that he can sell. He walks through the splendid sample rooms of this museum. The objects of commerce known to the world are spread out before him. Information with regard to each subject is cheerfully, quickly, accurately given him. Suppose that he desires to purchase wools. All of the wools furnished by all of the countries that export them are here for him to examine and compare. He not only examines the fibre, but is informed as to price, as to quantity of production, as to cost of transportation, insurance, commissions, exchanges, routes of carriage, all facilities for shipment, factors, agents and commission men with whom to deal; in short, here is given every item of information that he could acquire by a journey to that particular country and a personal investigation that would occupy months of time.

"As of wool, so of leather, of hides, of woods, of grain, or ores; in short,

of every conceivable article that any commercial people in any part of the world have to sell. He not only can see the raw material, but specimens of the manufactured articles of the country. If the inquirer wants to sell, or to manufacture for a particular people, he can see samples of that which they buy, or that they most desire. If there is a particular form of shoe, or a preference for colors, or for shades in textiles, he can be instructed in all of this in these ample sample rooms. To-day this institution has in every part of the inhabitable world its trained, intelligent agents, whose duty it is to study carefully the wants and resources of every people, whether they be buyers or sellers. And with the utmost fidelity they report what the buyers want, and what the sellers have; and they inform themselves with every detail that will be necessary to the conduct of an intelligent commercial transaction. They not only make these reports, but they are gathering the material for object-lessons for the eye, as you may see them in these neighboring rooms. Here, too, are gathered all of the trade journals of the world. Their important statements are culled, translated, classified and tabulated for instant use. So that, in a moment, inquiries as to articles, quantities, prices, modes of carriage, transportation prices, commissions, insurance, exchange, time of transit and all other factors of cost can be as completely answered as could be after months of travel and inquiry under the old methods of acquiring a knowledge of trade." If we study the present in the light of the past, we see how naturally present methods and institutions have been evolved and that our specializations of to-day are but the fruition of principles which long ago were started germinating.

REVIEWS AND BIBLIOGRAPHICAL NOTICES.

A TEXT-BOOK OF PHARMACOLOGY AND THERAPEUTICS, OR THE ACTION OF DRUGS IN HEALTH AND DISEASE. For the use of students and practitioners of medicine. By Arthur R. Cushny, M.A., M.D. (Aberd.), Professor of Materia Medica and Therapeutics in the University of Michigan, Medical Department, Ann Arbor. In one handsome octavo volume of 728 pages, with 47 engravings. Cloth, \$3.75, net. Philadelphia and New York: Lea Brothers & Co. 1899.

A work which is inspired by the writings of and dedicated to Schmiedeberg must have in it more than ordinary value. Professor Cushny has shown in his text-book a remarkable grasp on this coming and most interesting subject, which will place the studies of the clinician and the practice of medicine generally on a more scientific basis. While appreciating sharp demarcations and the necessity for them, the author has allowed himself to present the subject in such a way that it may be considered to be the entering wedge between the old empiricism and the new way of studying the changes produced by drugs on living organisms. The work is divided into six parts, besides having an introduction. In the introduction are considered (1) the mode of action of drugs, stimulation, depression, irritation; (2) elective affinity of drugs, protoplasm, poisons; (3) remote, local and general action; (4) chemical composition and pharmacological action; (5) conditions modifying the effects of drugs; (6) methods of administration; (7) chemical characters of drugs; (8) pharmacopœias and pharmacopœial preparations; (9) classification of drugs.

In Part I those organic substances are considered which are characterized

chiefly by their local action, and includes the action of demulcents, emollients, sugars and flavoring substances, simple bitters, volatile oil series, skin irritants and counterirritants, vegetable purgatives, vegetable astringents and anthelmintics.

Part II is given to the consideration of those substances which are characterized chiefly by their action after absorption. The following substances are considered: Narcotics of the mellose series, strychnine, opium series, hydrastine and hydrastinine, cannabis indica, apomorphine, prussic acid, caffeine, curara, conine, nicotine, lobeline, atropine, cocaine, pilocarpine, physostigmine, aconitine, veratrine, emetine, colchicine, saponin, solanin, aspidosperma, quinine, antipyretics, antiseptics, including formaldehyde, camphor, picrotoxin, digitalis series, nitrites and ergot. Part III is devoted to the consideration of the action of the alkalies, alkaline earths, acids and allied bodies. In Part IV the actions of the heavy metals are taken up. Part V is devoted to the ferments, secretions and toxalbumins, and in Part VI the menstrua and mechanical remedies are considered.

In general, we may say that in the consideration of the drugs the author gives a few general characters of them, mentions their preparations, with doses, and this is followed with the action, therapeutic uses, symptoms of their poisonous effects and a bibliography of the most important references. A careful perusal of the book shows that the author has carefully sifted the literature, digested the results of the foremost pharmacologists and therapeutists of the world, and that he has presented thereby a well-balanced, rational, scientific and practical work. The book is to be recommended to all who are interested in the use of medicines, and will, no doubt, have a large circulation, as the price is a very reasonable one.

MATERIA MEDICA, PHARMACY, PHARMACOLOGY AND THERAPEUTICS. By W. Hale White. Edited by Reynold W. Wilcox. Fourth American edition. Thoroughly revised. Philadelphia: P. Blakiston's Son & Co.

This work, which has previously been favorably reviewed in this JOURNAL, still maintains the qualities which have made it so useful as a text-book in medical schools as well as colleges of pharmacy. The present edition is the fourth American edition and has been thoroughly revised since the recent appearance of the second English edition. In addition to the rearrangement in general, the drugs of animal origin are arranged in groups showing their uses, and, in the appendix, classified according to their source. For the convenience of the student a very complete index has been prepared. The work has been carefully revised and will continue to have a large sale, as it may be considered a *multum in parvo* on materia medica, pharmacy, pharmacology and therapeutics.

SCHLEIF'S MATERIA MEDICA AND THERAPEUTICS. A manual of materia medica, therapeutics, medical pharmacy, prescription writing and medical Latin. For the use of students and practitioners of medicine. By William Schleif, Ph.G., M.D., Instructor in pharmacy in the University of Pennsylvania. In one very handsome 12mo volume of 352 pages. Cloth, \$1.50, net. Philadelphia and New York: Lea Brothers & Co.

In the preface it is stated that "This volume is intended to afford a condensed yet comprehensive text-book and work of reference on materia medica, thera-

peutics and a range of cognate subjects which can be grouped with manifest advantage. In addition to the paragraphs covering the physical properties, physiological action, therapeutics and toxicology of each medicinal agent, chapters will be found on prescription writing, medical Latin, medical pharmacy and practical anæsthesia. Tables of doses, of poisons and antidotes, and of incompatibilities, together with a therapeutic index of diseases and remedies and a general index, conclude a volume which it is hoped may prove of service to practitioners as well as students. It contains in a concise, definite and assimilable form the essential knowledge required in the most complete college courses on *materia medica* and therapeutics."

While Professor Cushny's book, which we referred to in this JOURNAL on page 489, is evidently written by one who has had a good scientific training and strong tendencies in a pure pharmacological direction (*i. e., treating of the action of drugs*), it may be said that the work of Dr. Wilcox (also reviewed above) has a more extended treatment by one who is rather appreciative of all that enters into a knowledge of the *administration* of drugs in disease; and further, in the book of Dr. Schleif we find an epitome of not only the general characteristics and properties of drugs, but of physiological action, therapeutics, preparations and doses, and it is particularly distinguished from the other works in that the *best form of administration* of remedies is also given. Dr. Schleif shows the value of his pharmaceutical education, and the facts contained in this book refute the statement in Professor Cushny's book that "pharmacy will probably occupy a still more subordinate position in medical education as the tendency to include only one or two drugs in a prescription becomes more widely spread. As long as a dozen or more components went to make one mixture, it was of importance to know their solubility and their interactions, but with the decay of the complex prescription, the study of pharmacy by medical students certainly has become less imperative." It is not our province to say whether pharmacy should be taught the medical student, but we must add that the compounding of prescriptions is based on more than solubility, and that elegant pharmacy requires even a greater knowledge than this, and it is the art of making medicines palatable.

AMERICAN PHARMACEUTICAL ASSOCIATION.

The 47th annual meeting of the American Pharmaceutical Association was held at Put-in-Bay, Lake Erie, Ohio, on September 4-9. The first general session was called to order by the President, Charles E. Dohme, of Baltimore, on Monday afternoon at 3.45. The president introduced the Local Secretary, Mr. L. C. Hopp, who, in turn, introduced the Mayor of Put-in-Bay, who made an excellent address of welcome. Prof. J. U. Lloyd then welcomed the Association on behalf of the Ohio pharmacists, giving some of the history attached to the islands in that locality, referring to Perry's victory and calling attention to the willow tree around which his dead officers were buried after the battle. He also spoke of the peculiar geological formation of the islands, with their limestone and strontium caves, etc. Mr. Dohme invited Prof. J. M. Good, of St. Louis, to respond, and the latter paraphrased Perry's message by saying "we have met the enemy and we are theirs."

Mr. Hopp then announced the programme of the meeting, after which the President delivered his address, which contained many suggestions looking to

the welfare of the Association. In considering the objects and work of the new National Association of Retail Druggists, he said in part :

" Speaking of this cry of too many pharmacists and too many pharmaceutical colleges brings me to the subject of special interest to this Association, namely, the evidently approaching era of too many associations, and hence necessarily of too many divided interests and divided efforts for betterment in our calling.

" I think it but just and proper to enter a protest at this point against some statements which have found their way into the pharmaceutical and daily press, insinuating that this Association is not of or for the retail pharmacist, but is rather controlled by and exists for the benefit of the college professor and the large manufacturer. Such statements are as unjust as they are uncalled-for, and are certainly untrue. No one class of our members is benefited more by virtue of the American Pharmaceutical Association than another. We are all benefited as we should be if the purposes of the Association and its mission are fulfilled.

" The representation of retailers, manufacturers and teachers in one association was and is necessary to produce the beneficent effects and benefits which all must admit have already been produced by the influence of this Association, and the annual fraternal meetings of its members in the past.

" The beneficent results already attained will even be greater in the future, if we only make the proper efforts in our united strength to bring the influence of the Association to bear on the amelioration, if not the extermination, of existing evils, whilst a divided association and clannishness might fail to produce this result.

" The very good work the National Association of Retail Druggists has accomplished could in all probability have been accomplished as effectually by the American Pharmaceutical Association, provided the right men had been found to take the work in hand, and if the membership had been increased to make it a still more representative body of American pharmacists. Had the men who now dominate, lead and push the National Association of Retail Druggists been members of the American Pharmaceutical Association, and taken hold of our commercial section as they have that of the National Association of Retail Druggists, the same results, I feel sure, would have been achieved.

" Confronting the facts as they are, and not as they might have been, however, the National Association of Retail Druggists appears as a splendid and deserved success. As a sister organization, I heartily congratulate it upon its apparently certain successful mission of squelching the cutter. My highly esteemed and beloved predecessor in office, H. M. Whitney, proved to be, as he has on many previous occasions, a soothsayer and leader whose foresight was accurate and trustworthy, for in his address last year, as you will all remember, he dwelled more strongly than on any other topic upon the crying necessity of encouraging the commercial section and making the work of that section the prime object of our concern and work.

" But, ladies and gentlemen, no matter how essential it may be to foster and encourage the commercial branch of our membership and to strive with our new sister association to accomplish a reform and improvement in our business and financial relations, there is ample room left for other important aims. There is more in pharmacy and in the aims of our Association by many and many an acre than the restoration of old prices. Pharmacy is as much a

science and profession as it is a commercial calling, and its advance always has been and always must be in the channels of scientific research."

The remaining portion of the President's address was devoted to the consideration of the work of the Association through its various sections and officers. Referring to the metric system of weights and measures, he said: "Feeling confident that it is in the direction of advancement and progress to have a uniform system of weights and measures all over the civilized world, and believing that no other system equals the metric system in simplicity and practical value, I advise the continued efforts of this Association to have the Congress of the United States adopt it as the official system of weights and measures of the country. The U. S. Pharmacopœia has long since adopted it, and it would hence not be a radical departure to have the system generally adopted; certainly not as far as the pharmacist is concerned. In order that this suggestion may bear direct fruit, I would urge that our Committee on Weights and Measures, which, I think, embraces a member from each State of the United States where we have membership, make a determined effort at the next session of Congress, by either appearing before them in a body or by a central committee as large and influential as possible, and again present before the Committee on Weights and Measures of the House of Representatives and of the Senate and urge the necessity of making a move in this direction at this favorable opportunity—the beginning of a new century.

"The change will surely come about sooner or later, and we, being among the principal users of weights and measures, should certainly be active in its accomplishment, especially as our Association is and has been practically a unit in favor of its adoption.

"At the last annual meeting a resolution relative to the introduction of the metric system in medical schools was adopted, and the General Secretary was instructed to forward a copy of the resolution and the committee report to the various medical colleges. In November last the Secretary sent copies, as directed, to 235 medical schools, but replies from only four have come to hand, namely, the Woman's Medical College of New York, the Yale University Medical School, the Missouri Medical College and the Kentucky School of Medicine. Of these only the last-named was enthusiastic in tone, and promised to bring the matter up at the next meeting of the Association of American Colleges."

The President's address was referred to a committee consisting of Messrs. Henry M. Whitney, of Massachusetts; John F. Patton, of Pennsylvania, and Prof. Edward Kremers, of Wisconsin.

Professor Good then reported the names of the delegates in attendance.

Recess was then taken for the purpose of selecting members of the Nominating Committee for officers for the ensuing year.

The general session on Tuesday morning was devoted mainly to the reading of the reports of officers and committees. Mr. Geo. W. Kennedy, in the report of the Committee on Membership, stated that the number of active members of the Association was 1,306; number elected during the past year, 85; the number lost during the past year from one cause or another, 161, thus making the total membership at the present time 1,323, of whom 1,220 are active, 91 life and 12 honorary members. In the report Mr. Kennedy also referred to his closing twenty-five years of service as Secretary of the Council and of the Committee

on Membership. Upon the conclusion of the report Mr. W. S. Thompson, of Washington, D. C., moved that, in recognition of the faithful services of Mr. Kennedy to the Association, suitable resolutions be drawn and the same engrossed and presented to Mr. Kennedy. C. A. Mayo, of New York City, suggested that also a gold medal be made and presented to Mr. Kennedy. The motion was unanimously carried and a committee consisting of Messrs. W. S. Thompson, S. A. D. Sheppard and J. M. Good was appointed to carry out the wishes of the Association.

The Treasurer, S. A. D. Sheppard, then read his report, which showed the total amount of disbursements to be \$6,897.25, the total amount of receipts to be \$9,546.35, leaving cash on hand of \$2,649.10.

C. Lewis Diehl presented a preliminary report as "Reporter on the Progress of Pharmacy." The following committees also presented their reports: That on National Legislation, through its Chairman, F. E. Stewart; on National Formulary, by C. Lewis Diehl, Chairman; Charles Caspari, Jr., presented his report as Secretary. The Committee on Nominations presented the names of the following, who were duly elected officers of the Association for the ensuing year: A. B. Prescott, Ann Arbor, President; L. C. Hopp, Cleveland, First Vice-President; W. L. Dewoody, Pine Bluff, Second Vice-President; H. R. Gray, Montreal, Third Vice-President; Chas. Caspari, Jr., Baltimore, Secretary; S. A. D. Sheppard, of Boston, Treasurer; C. Lewis Diehl, of Louisville, "Reporter on the Progress of Pharmacy;" Members of Council, C. E. Dohme, H. M. Whelpley and L. Eliel.

The Committee on Time and Place of Meeting reported, through the Chairman, S. A. D. Sheppard, in favor of Richmond, Va., and the month of May, 1900, immediately after the adjournment of the meeting of the Pharmacopœia Revision Committee, to be held in Washington on the first Monday in May.

The Committee on Prizes announced the following awards: Ebert Prize awarded to Henry Kraemer, for his paper on "The Qualitative Examination of Powdered Vegetable Drugs." The general prizes of the Association were awarded as follows: First prize to H. M. Gordin and A. B. Prescott, for their paper upon "Certain Alkaloidal Periodides and the Volumetric Estimation of Alkaloids as Higher Periodides;" second prize to J. U. Lloyd, for paper upon "Standards for White and Black Mustard Seeds;" third prize to Wm. A. Puckner, for a paper upon "The Standardization of Volumetric Acid and Alkali." There was no award of the Hager Memorial Prize. The Maisch Memorial Prize was awarded to Henry Kraemer, for his paper upon "The Qualitative Examination of Powdered Vegetable Drugs."

At the third general session the report of the Committee on Pharmacy and Dispensing was read by the Chairman, H. P. Hynson.

The following suggestions and notes were received by this Committee: E. R. Selzer advised the addition of oil of cinnamon directly to the compound chalk powder, in proper proportion, to take the place of the oil in the cinnamon water of the U.S.P. He is of the opinion that the presence of the oil will prevent fermentation in the powder, which sometimes occurs when it is not properly dried. Wm. Mittelbach was of the opinion that the compound tincture of gentian should be allowed to stand at least a year, and to undergo varying temperatures before being filtered. This procedure will prevent the usual precipitate forming after filtration. He also considered the formula for soap liniment

in the U.S.P., 1880, as preferable to the 1890 formula. Further, that elixir of iron, quinine and strychnine phosphate should not be made in large quantities, and should be stored in small bottles, perfectly filled to avoid the discoloration of the product, which, he said, is prone to become dark.

J. H. Schmidt, in preparing the effervescent solution of magnesium citrate, boils and cools the water just previous to using, and adds the syrup of citric acid to the solution *before* filtering. In this manner a "sightlier" preparation is made, and one which will remain clear. To save time in making camphorated tincture of opium, he uses 40 c.c. of the tincture instead of 4 grammes of the powdered opium.

The following formula was offered by J. F. Kiedaisch, Jr., in preparing syrup of tolu : Balsam of tolu, 1.28 ozs.; sugar, 7 pounds; water sufficient to make 1 gallon. Place the balsam of tolu in a mortar and add 1 pound of sugar, rub them together into a coarse powder, then mix with the remaining sugar. Prepare a percolator, as described under "Syrup, U.S.P., 1890," into which the mixture is placed, and proceed to percolate with distilled water, returning portions of the percolate until it runs through clear.

Mr. H. T. Cummings called attention to the necessity of thoroughly incorporating pilular extracts into pill masses. He advised that the extract be well softened with water before it is mixed with the other ingredients of the mass. He has also found the water-bath useful in dissolving the extract of licorice in making brown mixture.

The use of tincture of gentian compound as an acceptable flavoring for elixir ammonium valerianate was suggested by Chas. H. Ware. He also finds that the sugar for syrup of wild cherry is best dissolved by percolation, and has had much trouble filtering the solution of licorice for brown mixture, and asks why glycyrrhizin could not be used instead of extract of licorice.

The following formula for making cold cream was offered by Wm. Gray: White wax and spermaceti, of each 6 ozs.; expressed oil of almonds, 3 lbs.; rose water, 1 lb.; sodium borate, 30 grs.; oil of rose, 2½ drs.; oil of patchouly, 5 drops. Prepare as directed by the U.S.P. It was claimed that this formula furnishes a product which will not become rancid, and that the rose water will not separate from the base.

One of the interesting features of the report was the comparison of the files of prescriptions filled in the same locality, written by the same class of physicians, for the same order of customers, consecutively for forty years. The statistics as presented seemed to show that pharmacy had not degenerated, and that more was not required of the dispenser in the "good old days" than now. The comparison made, in connection with close observation of the required manipulation, proved beyond a question that the requirements of to-day are far beyond those of any period during the life of this Association. This statement referred to scientific attainments, ready and comprehensive knowledge and to a knowledge of technique especially.

In conclusion, the report of the committee dealt with suggestions and helpful notes for the dispensary and laboratory of the retail pharmacist.

SCIENTIFIC SECTION.

The meetings of the Scientific Section were held on Tuesday and Wednesday. Owing to the illness of the Secretary, H. V. Arny, Caswell A. Mayo was made

temporary Secretary. The first order of business was the reading of the address by H. H. Rusby, Chairman of the Section. This was devoted to the discussion of "Science in the American Pharmaceutical Association." The Chairman contended that "there is no such thing in our day as impractical theory; nothing which is good in theory but bad in practice. This is the cry of either ignorance or duplicity. Good theory in these days is always good to practice, and, if the practice be equally good, is always good in practice. The most thoroughly scientific methods are, therefore, urged as the surest and, on the whole, the most rapid means of attaining to practical ends."

The report of the Committee on the Revision of the U.S.P. was then read by the Chairman, Leo Eliel. This was a very lengthy report, and devoted in part to a summary of all the work done by this Committee. The report was referred to Dr. Charles Rice, Chairman of the Pharmacopœia Committee. There was, however, considerable discussion upon some of the recommendations contained in this report. The recommendation that spirituous liquors, etc., be dismissed from the U.S.P. was combatted by quite a number. While quite a number of the members attested that the calls for wines, brandy, etc., upon physicians' prescriptions were relatively small, probably not more than one-tenth of 1 per cent., Professor Lloyd said that more liquors were prescribed than we think, and that, as they are generally in the house, the physician does not write prescriptions for them. Professor Remington thought that it was a mistake to recommend the report of the Committee on this subject to the U.S.P. Committee, and that the Pharmacopœia is the book where the tests for distinguishing between pure brandy, etc., and the "stuff" that is frequently sold ought to be given. He would go further, even, and advise that an additional committee be appointed to investigate the subject, so that tests should be devised that the physician and patient could get the pure article desired.

Professor Remington moved that, owing to the illness of H. V. Arny, the Secretary of the Section, a letter be prepared and sent him, deploring the loss of his services at this time, and expressing the hope that he may be permitted to resume his duties, and that good health and prosperity may be abundantly restored to him. This was agreed to, and Professor Remington and C. A. Mayo were asked to draw up the same. The officers of the Section elected for the ensuing year are Frank G. Ryan, Philadelphia, Chairman; Caswell A. Mayo, New York City, Secretary; F. C. Hemm, Associate. The following papers were presented:

ADDITION PRODUCTS OF OXIDES OF NITROGEN TO SESQUITERPENES.

BY O. SCHREINER AND EDWARD KREMERS.

The authors have, as a result of the action of sunlight upon the sesquiterpenes, obtained certain compounds which throw considerable light upon the study of this group of organic substances.

In discussing this paper Dr. W. C. Alpers said:

"Dr. Kremers remarks on the tendency of nitroso-additive products of sesquiterpenes to form white polymers is of great interest to me. During the last year, in the course of experiments with araliene, a new sesquiterpene that I isolated from the ethereal oil of *aralia nudicaulis* (See this JOURNAL, 1899, p. 370), I noticed the formation of a white mass, that I was unable to explain.

This white substance appeared when I tried to crystallize the nitroso compounds of araliene. I attributed its presence to unknown outside influences, and made no effort to determine its composition. I am now inclined to believe that such a polymer, as Dr. Kremers has described, was formed."

THE DETERIORATION OF WILD CHERRY BARK WITH AGE.

BY A. B. STEVENS.

The author has estimated the amount of hydrocyanic acid in barks examined at different times, as March, 1898, and March, 1899. He found a more marked deterioration in the powdered bark than in the whole bark when kept in the usual containers. He recommended that the whole fresh bark only be used in the manufacture of galenical preparations, and says that the bark is best preserved in glass or air-tight containers.

STRUCTURE AND DEVELOPMENT OF SEEDS.

BY A. VON ZWALUWENBURG AND J. O. SCHLOTTERBECK.

The authors have examined the structure and development of seeds of cacao and cotton. The object of this work was to trace the development of the tissues in ripe seeds, and is necessary for accurate pharmacopœial descriptions.

SUGGESTIONS ON THE EXAMINATION OF DRUGS.

BY ALBERT SCHNEIDER.

The author gave a brief general discussion of the evolution and development of the five sense organs and their use and relationship in the examination and identification of substances. The following was given as the logical and natural sequence in which the senses should be employed in the examination of drugs—sight, touch, smell and taste. Hearing is of no practical value in the examination of drugs. Attention was called to the lack of reliable standards of color and odor. The author also called attention to sensations which are erroneously named odor and taste sensations. Practical suggestions were given as to the best way of bringing out the odor and taste of drugs.

THE IDENTIFICATION OF POWDERED DRUGS.

BY ALBERT SCHNEIDER.

The author maintained that the most reliable and permanent characteristics of drugs are the histological, as they remain constant, while color, odor and taste are subject to change. Color, odor and taste should, however, be made use of in so far as it is possible. A key to about 175 official and unofficial powdered vegetable drugs was given, based wholly upon microscopical structure as revealed through a good compound microscope.

COLOR STANDARDS OF POWDERED VEGETABLE DRUGS.

BY HENRY KRAEMER.

The author has evolved a set of color standards representing about eighteen colors, to which the descriptions of all of the powdered drugs of the U.S.P. could be referred. The author stated that the value of this work was only in that it gave an opportunity for bringing the color descriptions of drugs in the Pharmacopœia and of writers to a uniform basis, and that the color standards could not be utilized in determining the value of drugs.

NOTES ON ODOR STANDARDS.

BY W. C. ALPERS.

Odors have been classified by many investigators, the oldest being Linnæus, who established seven odors, beginning with ethereal odors and ending with nauseating odors. These classifications leave the decision to the likes or dislikes of the observer, and lack scientific precision. It is necessary to take the physiological function of smelling into account. A chemical reaction takes place between the odorous substance and the secreted serum on the ends of the olfactory nerves. To substantiate this theory, the author quoted from a paper by O. I. B. Wolff, who, by means of the olfactory apparatus of the bee, and with the aid of the microscope, proved the correctness of the view. A further proof is found in the sensation caused when the ions of a weak solution of some salt held in the nostrils are gathered by means of an electric current at the two poles, one of which is formed by the olfactory nerves. In the case of NaCl and NaNO₂, the same sensation is experienced as when Na ions are gathered around the nerve; different sensations when Cl or NO₂ ions are gathered there.

Therefore, only volatile substances of definite composition can form odor standards, so that only one reaction may take place and only one sensation be produced. All substances whose odor depends on a series of volatile substances will produce mixed odors. The author believed that, by studying the sensations produced by definite chemical compounds, a scientific classification of odors will some day be possible.

FURTHER WORK UPON THE ESTIMATION OF ALKALOIDS AND THE ASSAY OF ALKALOIDAL DRUGS.

BY H. M. GORDIN AND A. B. PRESCOTT.

This paper will be printed in full in a later issue of this JOURNAL.

DIRECTIONS FOR CERTAIN ALKALOIDAL ASSAYS.

BY H. M. GORDIN AND A. B. PRESCOTT.

This paper is printed in full in this JOURNAL. See p. 462.

THE VALUATION OF DRUGS.

BY HENRY KRAEMER.

The author considered this subject from a rather broad standpoint, and endeavored to bring into the consideration of it as many things as will assist in the solution of the problems involved. The methods considered were: (1) Chemical; (2) Physical; (3) Microscopical; (4) Biological; (5) General optical. This paper will be printed in full in later issues of this JOURNAL.

PHYSIOLOGICAL ACTION AS A DEPARTMENT OF PHARMACEUTICAL SCIENCE.

BY E. M. HOUGHTON.

This paper is printed in full in this JOURNAL. See p. 473.

THE COMPOSITION OF HYDRASTIS.

BY A. R. L. DOHME AND HERMANN ENGELHARDT.

The authors made an examination of the drug collected in fall and spring and of the rhizome free from the roots and the roots alone as well. They

have found the alkaloid in a free state and also combined with an acid in the drug. The rhizome and roots, or rhizome free from the roots, contain nearly the same amount of alkaloid (2-3 per cent.). The rhizome and roots gathered in the fall contain less hydrastine, and there is apparently present another alkaloid which is believed to be canadine. The drug, when gathered in the spring, contains more alkaloid than when gathered in the fall. A comparison of the methods of assay proposed by Prescott, Linde and Keller showed the latter to be generally more satisfactory, and that Prescott's method required more time and gave poorer results.

THE ASSAY OF HYOSCYAMUS.

BY W. A. PUCKNER.

The modified method of A. W. Gerrard, followed by F. X. Moerk in his work on belladonna leaves (AMER. JOUR. PHARM., 1899, p. 105), was applied by Puckner to henbane. The directions of Moerk were closely adhered to with one exception: in the final extraction of the alkaloid pure chloroform was substituted for the ether-chloroform mixture, thus avoiding the formation of an emulsion, and with it the addition of stearic acid. The alkaloidal residue from 20 grammes of drug required 0.65 c.c. of decinormal acid. In a duplicate determination, 0.60 c.c. was used. The average, 0.63 c.c., indicated 0.91 per cent. of alkaloid, and corresponded to the yield obtained with Schwickerath's altered method.

THE INTRODUCTION OF SCOPOLA TO THE U.S.P.

BY H. H. RUSBY.

This paper was suggestive of the character of the work that ought to be performed in order to answer the query, "Is it proper to make belladonna preparations from scopola in the face of the present U.S.P. definition? Should the U.S.P. change its definition so as to sanction the use of the rhizome as an alternative?" He also urged more especially the large manufacturing chemists to use the correct name of *Scopola Corniolica*, Jacq., as displacing the frequently used generic synonym *Scopolia* (which refers to an absolutely different plant-genus) and the specific synonym *atropoides*, which violates all the generally accepted rules which it is the duty of scientific people to observe.

SCOPOLA AS A PRACTICAL EQUIVALENT OF BELLADONNA.

BY S. W. WILLIAMS.

The object of the writer in this communication was not to present the results of further original investigation, which might be viewed as savoring of prejudice in favor of a position previously taken, but to direct attention to the obviously disinterested statements of standard authorities, directly bearing upon the merits of the question, and which are easily accessible to the pharmacist for verification. He said:

"To recognize an article as belladonna plaster simply because it is made from 'belladonna,' when the drug, and consequently the plaster, may vary to hundreds or thousands per cent., while declaring a standardized scopola plaster unworthy of the same title, is to needlessly sacrifice virtue and practicality, to worship a name and ignore therapeutic value, to place an ill-conceived no-

tion of pharmaceutical ethics above a rational view of practical medicine, in short, to exalt an obviously inferior over an admittedly superior preparation. This never has been and never will be the design of the Pharmacopœia."

If demonstrated merit wins, the next Pharmacopœia, by granting to Scopola official recognition, will make ethical the employment of a most valuable drug which in every practical way is an equivalent of *Atropa belladonna*, at least so far as relates to external preparations. The writer believed that the second portion of the query (viz., "Should the U.S.P. change its definition so as to sanction the use of the rhizome as an alternative?") should have an affirmative answer, because the active principle, upon which the therapeutic action of belladonna depends, is yielded in larger proportion and with greater uniformity by Scopola than by either the leaf or root of *Atropa belladonna*, and because the results of clinical tests were favorable to scopola.

IDENTIFICATION OF ORGANIC SUBSTANCES.

BY E. H. BARTLEY.

The author offered a scheme for the identification of organic substances used in pharmacy and commonly met with in commerce. Beginning with the inspection of general physical characters, the substance is heated on a platinum foil, etc. The ultimate qualitative composition is then determined and the group of organic bodies to which the substance belongs is then determined.

DOES TARAXACUM CONTAIN AN ALKALOID?

BY A. VON ZWALUWENBURG AND M. GOMBERG.

After treating the subject historically, the authors gave steps, first, in purifying solvents used, and then in the extraction of the alkaloidal-like substance. They obtained minute quantities of a substance which contains nitrogen, gives reactions with certain alkaloidal reagents, but is not alkaline. The substance does not form either amorphous or crystalline salts. The authors expressed grave doubts as to the presence of an alkaloidal substance in *Taraxacum officinalis*, L.

PREPARATION OF SPIRIT OF NITROUS ETHER.

BY JOSEPH FEIL.

The process proposed requires about fifteen to twenty minutes' time, and the manipulations are such as any one skilled in ordinary chemical manipulations can easily carry out. Sodium nitrite, 30 grammes; sulphuric acid, 20 grammes; alcohol, sufficient. The sodium nitrite and 300 grammes alcohol are placed in a liter flask with a two-hole cork or rubber stopper; in one of the openings is placed a stoppered funnel of any description, the other has a glass tube connected with an upright condenser kept cool with running water.

The sulphuric acid is placed in the funnel, the mixture is then heated until the alcohol is about beginning to bubble, the heat withdrawn and the sulphuric acid slowly added; after action ceases, heat is again applied a moment or two and withdrawn. A second repetition may again cause an action to begin; usually this does not occur, although it is best to try it.

The contents of the flask are allowed to cool and then filtered in a well-covered funnel and alcohol added to make 450 grammes. It is, of course, preferable to assay the filtrate and then dilute, but a large number of experiments gave very close results to the quantities stated.

PEPSIN TESTING.

BY GEORGE H. BERDRICK AND L. E. SAYRE.

This paper, in the absence of the authors, was read by title and referred to the Committee on Publication.

SECTION ON EDUCATION AND LEGISLATION.

This section met on Friday morning with the Chairman, A. B. Lyons, in the chair. The first order of business was the reading of the annual address of the Chairman, which dealt with a number of important questions. In it it was proposed that (1) the American Pharmaceutical Association, in conjunction with the respective State pharmaceutical and medical societies, be authorized to select the names of those who are desirable to serve as members of the State Board of Pharmacy of the respective States. (2) The requirement of the proper labelling of crude drugs for shipment should be made a matter of legislation. (3) The Research Committee consider methods of pharmacological assay in connection with their other work. (4) It is desirable for the Association to secure an endowment for the establishment of a research laboratory and an organ of publication independent of advertising matter. (5) The present method of nomenclature followed for newer medicinal mixtures be deplored. The address of the Chairman was referred to a committee consisting of Messrs. Eccles, Stevens and Reed. The Secretary then read his report, which was referred to the Council for publication. The report was a summary of all pharmaceutical legislation in the United States, and statistics relating to pharmacy in the United States.

The Secretary then read a report upon pharmaceutical statistics. Thos. F. Main spoke on "The Poison Bottle Bill," as introduced into the New York Legislature, the efforts made to pass it and what it would have cost the pharmacists if it had passed.

Two resolutions were offered independently by Messrs. Oldberg and Sheppard to the effect that it be required of candidates for examination by boards of pharmacy that they have received a college education. The resolution as proposed by Mr. Sheppard was finally accepted, viz.: "*Resolved*, that the American Pharmaceutical Association represented by the Section on Education and Legislation hereby expresses its approval of the proposition that none but graduates of recognized colleges of pharmacy be received by boards of pharmacy for examination." Those participating in the discussion were Messrs. Remington, Beal, Hallberg, Bartley, Mayo and Prescott.

It was proposed that J. H. Beal, of Scio, Ohio, be requested to report next year on a "model pharmacy law." A committee of three, consisting of Messrs. Eliel, Helfman and Ebert, was appointed to investigate the subject as to whether crude drugs are shipped without labels.

F. E. Stewart, Chairman of the Committee on National Legislation, presented a lengthy report, which was considered to be judiciously and ably prepared. In it it was considered that: "The rapid growth of commercialism during the past twenty years is a menace to the educational and professional interests of pharmacy and to the Pharmacopœia. The vocation must be practised on a basis of reciprocity, whereby all are forced to comply with professional and scientific requirements; for justice demands that every pharmacist should have an equal chance with his fellows to make a living, and he who gives away the knowledge

of his discoveries is placed at a decided disadvantage unless he also receives knowledge in exchange. In the light of these facts, let us approach the important subject before us."

In referring to the secret-nostrum trade, he said: "Our objectors fail to discriminate between property in *goods* and property in marks used to distinguish between *brands*. We have never advocated the destruction of property rights in either. What we do say is that the attempt of the secret-nostrum trade to create monopolies in the manufacture and sale of medicinal agents belonging to the public, by concealing their identity and advertising them under coined names as new discoveries, is an invasion of public rights. It is not fraud for a pharmacist to substitute an open pharmaceutical preparation of his own manufacture for a nostrum of secret composition with the buyer's consent. It is legitimate competition. All competition is substitution, and competition is what the nostrum manufacturers fear."

In considering the subject of product *vs.* process patents, the Chairman said:

"By products is not meant natural products, but those resulting from the practice of the chemist's art. Shall we grant patents for the latter when they are chemical inventions in the meaning of the patent law? The patent law requires that such products shall be the result of processes in which a higher degree of skill is displayed than what is naturally to be expected from skilled chemists in the ordinary practice of chemistry. Theoretically, it appears indeed as if the limiting of patents to processes would best stimulate competition in the devising of new processes. So far as known, however, no method has been suggested whereby under present laws the manufacturers may secure the reward due them for divulging their processes by patenting them, unless the products themselves be also covered by the patents.

"However, if the Government should conclude to limit patents to processes only, the burden of proof should be thrown upon those claiming to have invented new processes for producing the same products. This might be done by compelling the inventors of alleged new processes to divulge them by applying for patents, so that the novelty in each case may be determined by the Patent Office. It is argued with force that it is the original inventor who conducts the expensive research which points out the way. It is he who sows the seed, and unless the new process should show decided novelty, and its inventor should pay a royalty to the original inventor, great hardship would often result, for the harvest would in many instances be reaped by those who have not sown, and the original inventor would have only his trouble for his pains."

In considering the situation of the manufacturers of "proprietary pharmaceuticals," the Chairman said:

"Two suggestions have been made for the purpose of aiding the manufacturer in this connection. The first secures the final publication of exact knowledge of the invention, the latter does not. The first plan was submitted to the commission on patents and is now under consideration. The Hon. Francis Forbes, Chairman of the commission calls it a 'secret patent' system, and says that similar plans have been adopted by other countries, but have been given up. Why, he does not know, except it be to harmonize their patent laws to ours.

"The other plan suggested is known as the 'British Analytical Control.'

If adopted it would establish a voluntary censorship over the introduction and marketing of new remedies, and protect the reputation of those who manufacture the older products and preparations, as well as the new, but it does not provide for a final publication of working formulas for the benefit of pharmaceutical science."

In regard to the introduction of patented synthetics into the Pharmacopœia, the Chairman said:

"Standing right in the way of the Pharmacopœia has been the question of the private ownership of names, for the admission of private names into that work was not to be thought of. But that question seems to have been settled by the Supreme Court in the Singer sewing machine case.

"Freed from that trade-mark monopoly scheme, shall patented synthetics be made official in the U.S.P.? The objection has been urged that, being introduced by advertising their therapeutic value is problematical, but that objection no longer maintains regarding some of them which have been introduced for sufficient time to give them a permanent place in the *materia medica*. Another objection is the commercial prestige which will accrue to their manufacturers. This might be answered by saying that such prestige should be part of the reward given the inventor for divulging his invention by patenting it.

"If we are to indorse the application of the patent law to pharmacy so far as to sanction a limited monopoly of products resulting from the chemic art in exchange for a publication of exact knowledge of each new addition, why withhold credit and commercial prestige from the patentee? Professional men in medicine and pharmacy have advocated for years that we should use every effort to have laws placed on our statute books and enforced against medical monopolies of all kinds. We have made certain exceptions by passing the preamble and resolution favoring patents on processes. Shall we go a step further and admit patents on products? If so, where do we then stand? We stand against monopolies created by secrecy as to processes or products, but admit that until a period of civilization and enlightenment is reached permitting the enactment of laws and their enforcement limiting the manufacture and sale of medicines to those who are educated and trained as pharmacists, and forcing them to conduct their business on humanitarian grounds, the protection of the patent law to medical chemical industries is ethical and right."

After much discussion of this address, the following resolution was offered by W. S. Thompson:

"*Resolved*, That the United States Government be requested not to register as a trade-mark any word to be used as the generic or specific name of the article itself, and that symbols or figures only be registered as trade-marks."

Mr. Thompson further moved "that we recommend that the law governing the patenting of processes be amended to further protect the patentee." Both resolutions were carried and were referred to the Chairman, F. E. Stewart, to be transmitted to such of the national authorities as he may think most desirable.

R. G. Eccles moved that the Association approves of the granting of patents on products. The motion was discussed by several of the members. C. S. N. Hallberg offered a substitute, which also was discussed by a number favoring it, and finally by Professor Remington, who opposed it. Dr. Bartley then moved that the whole subject be laid upon the table, which was agreed to.

It was moved by C. S. N. Hallberg that the officers of this Section for the ensuing year be requested to prepare a plan for a basis of preliminary education for admission to colleges of pharmacy. This was amended by C. A. Mayo to read "and if possible suggest a common curriculum." After some discussion, the motion as amended was carried.

The following are the officers of the Section for the ensuing year: Chairman, C. B. Lowe, Philadelphia; Secretary, J. A. Koch, Pittsburg.

The following papers were presented:

A PLEA FOR THE INTRODUCTION OF DOSES INTO THE PHARMACOPŒIA OF 1900.

BY HARRY B. MASON.

The author concluded that "There is no good reason why doses should not be introduced into the Pharmacopœia of 1900. There are many good reasons why they should be so introduced. Pharmacists want them; physicians want them. They would tend materially to bring about that general use of the book for which it is designed and upon which its success depends. They would, by virtue of this increase in the use of the book, improve pharmaceutical practice by an inevitable increase in the prescribing of pharmacopœial preparations. Besides this, doses in the Pharmacopœia would benefit medical science. They would increase exactness and accuracy in medication. They would give the pharmacist that authoritative guide of which, as safeguard to the physician, he is in great need, and with which the Pharmacopœia, as the authoritative book of standards, should supply them. With no good reason why the step should not be taken, and with several good and potent reasons why it should be taken, will the Pharmacopœial Convention of next May refuse to incorporate doses in the Pharmacopœia of 1900? Will it refuse to do what the pharmacopœial revisers of nearly every other country have recognized as necessary, and have done?"

The paper was discussed from all sides, and Mr. Sheppard moved that it is the sense of the American Pharmaceutical Association that doses be introduced into the U. S. Pharmacopœia. This motion was carried.

USE OF THE METRIC SYSTEM.

BY H. M. WHELPLEY.

The author gave a report on the use of the metric system in 545,000 prescriptions. This report was a continuation of those made in 1897 (see Proc., A.Ph.A., p. 303) and 1898 (*Ibid.*, 452). Of the 545,000 prescriptions analyzed, 598 per cent. were in the metric system. This makes it that out of the 1,008,500 prescriptions reported thus far examined by the author, about 6 per cent. complied with the metric system.

USE OF METRIC SYSTEM IN BOARD OF PHARMACY EXAMINATIONS.

BY H. M. WHELPLEY.

The author gave a list of the States, territories and colonies of the United States and the use they make of the metric system.

It was found that one State (New Jersey) and one territory (Oklahoma) do not use the metric system in Board of Pharmacy examinations.

Of those Boards reporting the use of the metric system, a majority state that it is used in every examination and for each applicant.

In discussing these papers, Professor Remington remarked that it was very encouraging to notice that the metric system was being taught in many of the schools to children. F. G. Ryan urged the medical schools to make use of the metric system and teach the same. Mr. Sloan, of Indianapolis, said that the medical school in Springfield, Ill., was doing what Professor Ryan had just suggested.

THE FRAMING OF A MODEL PHARMACY LAW.

BY HENRY M. WHITNEY.

The author said : " As all laws are supposed to be made for the best interests of the people, it is assumed that a pharmacy law is for the protection of the people. (1) To secure reliable drugs, true to name ; care, skill and accuracy in compounding and dispensing. (2) To prevent those not qualified and certified by State authority from claiming the right to compound, sell or dispense drugs, medicines, chemicals and poisons, to the probable injury of the people. The sale of intoxicating liquors for medicinal use, like some of the poisons, is also restricted by law, and their use in compounding and dispensing is a necessity in the drug store ; we have, then, for the pharmacy law to secure and approve : (1) Competent persons, qualified to assume the responsibility of conducting a drug store. (2) Sufficient wisdom and knowledge to prevent the sale of poisons for improper use. (3) Judgment and discretion in the sale of intoxicating liquors for medicinal use. (4) A clear, comprehensive appreciation of the law, as required by statute, and positive compliance with it."

HOW CAN WE MANAGE THE NOSTRUM EVIL?

BY R. G. ECCLES.

The author said that the granting of trade-marks to secret nostrums is a prostitution of justice, etc. " Let us insist upon every one of the proprietors of nostrums filing the full working formula of each of their preparations before they receive the protection of a copyright. Have it sufficient evidence for conviction when three well-informed pharmacists testify that by following the directions given they can produce no such product as the one trade-marked. Insist upon the trade-mark being distinct from the name by which the mixture is publicly known. After a definite number of years permit any person to make that same mixture, and sell it by the same name, but do not permit them to imitate the trade-mark of the original proprietor. The distinction between this class of goods and genuine patented goods under such law would exist in the fact that the nostrum need not comply with any test of originality or scientific principle, but could be had by any person on anything in the shape of a mixture simply on applying for the same at Washington and paying the fee."

EXAMINATIONS.

BY W. L. SCOVILLE.

The author called attention to the personal element as a part of the subject of examinations. The inherent imperfections which are in all of us mark both our opportunities and limitations, and it would seem that a frank acknowledgment of these qualities may lead not only to the avoidance of certain errors, but to the discovery of new methods and a higher degree of justice.

COMMERCIAL SECTION.

In the absence of the officers of the Section, H. P. Hynson was made temporary Chairman and Charles A. Rapelye, Secretary. In taking the chair, Mr. Hynson referred to the fraternal spirit that existed between the American Pharmaceutical Association and the National Association of Retail Druggists. The Chairman of the Executive Committee of the N. A. R. D., Mr. Holliday, was called upon and explained the work of that Association. He stated that the work of the Association is done through the representatives of the local organizations, and that the N. A. R. D. desired to be "set right" and to have the support of every one interested in pharmacy. Professor Good, one of the delegates of the A. Ph. A. to the N. A. R. D., who contributed very materially to the placing of the organization on a good foundation, also made a short address. Various other speakers from different sections of the country attested to the value of organization, and showed how they were enabled to maintain prices, etc. The whole tone of the meeting of this Section was that the condition of pharmacy was improving, and that the outlook of the commercial as well as professional sides of pharmacy was hopeful and encouraging. The officers of the Section for the ensuing year are James M. Good, Chairman; Chas. A. Rapelye, Secretary; F. W. E. Stedem, Associate.

SOCIAL FEATURES.

On Monday evening the President's Reception was held in the hotel. On Thursday most of the members went to Cleveland, by boat, and, after a carriage drive, took dinner at one of the hotels, returning to Put-in-Bay in the evening. On Wednesday evening Prof. John U. Lloyd gave a reading of selections from unpublished manuscripts of his book entitled "Stringtown on the Pike," being Northern Kentucky descriptions and folklore. This was one of the most interesting features of the meeting. In between the reading of the selections, Mrs. Joseph Feil and Miss Olinda Voss rendered some vocal solos. On Sunday about 100 of the members went to Detroit and were entertained by Parke, Davis & Co. On Monday morning the party rode to Parke, Davis & Co.'s laboratories and went through their establishment. It was indeed an opportunity for the members to see the methods of exactness and the degree to which specialization is carried out in a modern manufacturing laboratory whereby are ensured uniformity of products, skill in manipulation and the greatest possible returns for every expenditure of energy. What probably most interested the party were the biological laboratories, where the pharmacological work is carried on and where the various serums and antitoxins are prepared. In the afternoon the party was driven in trolley-cars through Detroit, visiting Belle Island and other places of interest. So much was the trip enjoyed that after dinner a formal set of resolutions was prepared and signed by all the members, in which due acknowledgment was made of the appreciation of the members of the hospitality of Parke, Davis & Co.

FINAL GENERAL SESSION.

The minutes of the previous general session and of the Council were read and approved. W. S. Thompson presented, on behalf of the Association, a gold badge with suitable inscription to Mr. Kennedy, the Secretary of the Council, in commemoration of the completion of twenty-five years of faithful service to

the Association in that capacity. Mr. Kennedy, in replying, thanked the Association for the honor it had conferred upon him, and hoped always to merit such recognition from the Association.

The following resolution, prepared by Jos. P. Remington in compliance with the instruction of the Council, had been adopted by the Council and appeared in the minutes of that body and also read and adopted by the general session:

"The American Pharmaceutical Association, desiring to express its high appreciation of the distinguished services of our eminent member, Edward Robinson Squibb, M.D., to American pharmacy, and in commemoration of the eightieth anniversary of his birth, July 4, 1899, offers to him its most hearty congratulations. His long and arduous labors for the advancement of pharmacy, his high standards of professional practice, and his unselfish devotion to the highest ideals, have endeared him to every member. That many years of usefulness and continued good health may be vouchsafed to our honored member is the unanimous hope and wish of this Association."

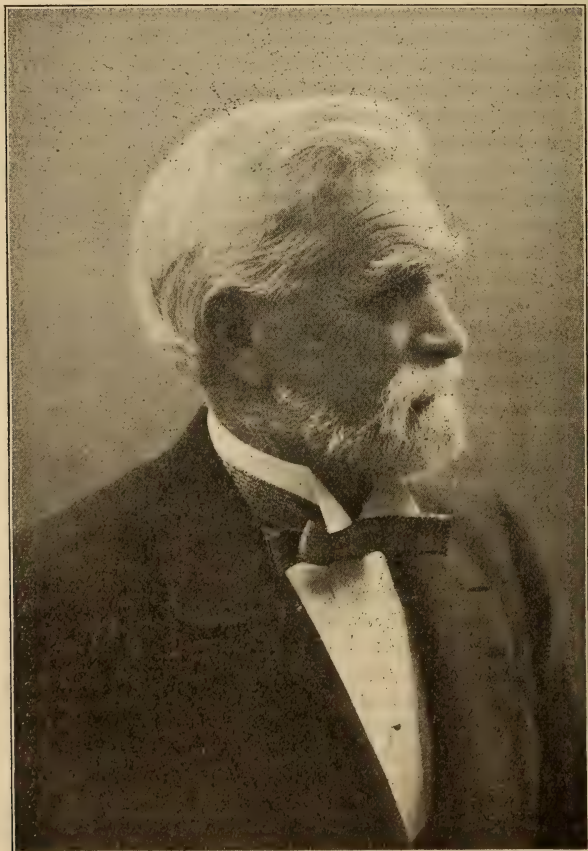
The Committee to report on ex-Président J. U. Lloyd's 1888 address presented a lengthy report through the Chairman, H. M. Whelpley. In it it was stated that some of the suggestions apropos then, are out of place to-day, and that some of the propositions contained in the address have since been before the Association and acted upon.

F. G. Ryan, Chairman of the Committee on Weights and Measures, reported that, while no action had been taken by the last Congress, there was a visible growth in sentiment regarding the adoption of the system. Mr. Hynson stated that if commercial houses, in sending out their goods, would give the quantities in the metric system, an important educational work for the system would be done. C. S. N. Hallberg suggested that the Committee devise a system of popular metric equivalents, as metric pint, metric pound, etc. J. P. Remington urged every member to support the Committee in its work by enlightening the members of Congress and others on the needs of the sanction by the Government of the metric system. Mr. Reed said that all arguments in favor of the adoption of the metric system are of little avail compared to the possible universal use of the system. Mr. Sheppard then moved that the Association direct the attention of commercial houses to the advantages accruing from sending out goods in packages based on metric weights and measures. Various other reports were read, and in connection with the report of the Committee on the Semi-Centennial Celebration of the American Pharmaceutical Association in 1902, Mr. Albert E. Ebert directed the attention of the Association to the fact that one of the founders of the American Pharmaceutical Association, and the "father of American pharmacy," William Procter, was being to some extent forgotten by this generation, and that it would be well for the Association to do something at that time to revive his memory. The session was concluded with the installation of officers for the ensuing year.

NATIONAL ASSOCIATION OF RETAIL DRUGGISTS.—The first annual convention of the Association will be held in Cincinnati, beginning at 10 o'clock, Tuesday morning, October 3d. The meeting will be held in Assembly Hall, Odd Fellows' Temple, Seventh and Elm Streets. The headquarters of the Association will be the Grand Hotel, Fourth Street and Central Avenue, opposite the Central Union Depot.

PERSONAL.

Albert Benjamin Prescott, President-elect of the American Pharmaceutical Association, is best known as an author and investigator in chemistry and an educator in pharmacy. He was born in Hastings, N. Y., December 12, 1832. He studied both medicine and chemistry in the University of Michigan, and in 1864 entered the medical service of the army, commissioned as assistant surgeon in the general corps, known as the United States Volunteers. He was



ALBERT BENJAMIN PRESCOTT.

assigned to duty on the Board of Examination for contract surgeons, and was surgeon-in-charge of Foundry General Hospital, Louisville, Ky. In 1865 he entered upon college teaching, in which he has been engaged up to the present. From the organization of the School of Pharmacy of the University of Michigan, in 1868, he was an active promoter of laboratory methods in phar-

maceutical education. While director of the chemical laboratory and professor of organic chemistry for all departments of the University, he has served as the dean of the department of pharmacy. Since 1880 his work as a teacher has been devoted almost exclusively to his chosen subject, organic chemistry. His students represent nearly every department of the University. He speaks slowly and concisely, voicing the knowledge he has to impart in unmistakable terms.

His success as a teacher may be best stated by quoting the words of one of his pupils, who said that he had listened to "many teachers, both in this country and in Europe, but had found none who excel him in clearness of expression, so that ideas can be readily grasped by the student." Dr. Prescott is a very busy man, accomplishing a great amount of work without apparent haste, and yet he is never too busy to patiently and carefully explain the minutest point to a student seeking after knowledge.

In research his subjects have mostly been taken from organic and analytical chemistry. In the pharmacopœial revision of 1880, Dr. Prescott was chairman of the sub-committee on descriptive chemistry, and prepared the directions for volumetric estimation upon their introduction into this work. This year he has written the chapter upon alkaloids for the forthcoming American Text-book of Toxicology. Professor Prescott is a member of many scientific societies. He is President of the American Association for the Advancement of Science and a councillor in the American Chemical Society. As to the American Pharmaceutical Association, Dr. Prescott expresses his conviction that it has a future of great good before it. It is a body of able and devoted workers, bent upon the support of scientific investigation, the maintenance of sound commercial principles and the union of all the interests of pharmacists in this country.

OBITUARY.

SIR EDWARD FRANKLAND, one of the most distinguished of English chemists, died on August 9th, in Norway, where he had gone for recreation.

He was in the seventy-fourth year of his age, having been born at Churchtown, near Lancaster, in 1825. His preliminary education was obtained at the Lancaster Grammar School, and his studies in chemistry were pursued at the Museum of Practical Geology, in London, under Playfair, and in the laboratories of Liebig and Bunsen, at Giessen and Marburg.

To Frankland has been ascribed the hypothesis of the atomicity of the elements, his views regarding this subject having been communicated to the Royal Society in 1852. These were based on deductions from his studies of the organo-metallic compounds, bodies formed by the union of a positive organic radicle with a metal. His discovery of these compounds was made in 1850, when he announced the preparation of compounds of zinc with ethyl and methyl, and predicted the existence of other similar bodies. In 1851 he was appointed professor of chemistry at Owens College, Manchester, and it was at this time that he began his work in applied chemistry, his most important contributions to this subject being those on the questions of water supply and sewage. In company with Tyndall, he spent a night on the very summit of Mont Blanc, in August, 1859, for the purpose of determining whether the rate

of burning of bodies requiring a supporter of combustion is independent of the density of the atmosphere in which they are burnt. This question was answered in the affirmative. In addition to his other investigations, physiological chemistry likewise received a share of his attention.

Frankland's scientific attainments won for him the highest honors in his own country, and many honorary distinctions from abroad as well.

ANTON SCHÜRER V. WALDHEIM, the most prominent representative of Austrian pharmacy, died at Vienna, on August 13th, in the seventieth year of his age.

Waldheim was born in Vienna, and his education was obtained in the schools of that city. In 1846 he finished a course at the Academic Gymnasium, after which he applied himself to the study of philosophy for two years. Meanwhile (in 1846) he also took up the study of pharmacy in his father's Apotheke, and from 1852 to 1854 attended the course in pharmacy at the University of Vienna, receiving the degree of master of pharmacy in the latter year. Later on he served in pharmacies in Dresden, Paris and London, and in 1856, on the death of his father, took charge of the latter's Apotheke in Vienna, which he held during the remainder of his life.

Waldheim was officially connected with a large number of organizations for promoting the interests of pharmacy, and for more than thirty years devoted himself, at the sacrifice of much time and money, to this cause. He was the chief spirit in the movement for the adoption of an International Pharmacopœia, and this undertaking failing in its accomplishment, he became an advocate for the adoption of an International Pharmacopœia of Potent Remedies, and was a member of the committee for carrying out plans for the organization of an International Pharmacopœia Commission. He was the representative of the Austrian Apotheker Verein at the International Pharmaceutical Congresses at Paris (1864), Vienna (1868), St. Petersburg (1875), London (1881), and at Brussels (1885). At the latter Congress he was also the representative of the Austrian Government, and submitted to the Congress the draft of an International Pharmacopœia. At St. Petersburg he was the President, and for his services in this capacity was made a knight of the Russian Order of St. Ann. He was also a knight of the Franz Joseph Order of Austria.

He was an honorary member of various Continental pharmaceutical societies; the Pharmaceutical Society of Great Britain, the British Pharmaceutical Conference, the American Pharmaceutical Association, and in 1889 was elected an honorary member of the Philadelphia College of Pharmacy.

NEW ECONOMICAL PLANTS OF EAST AFRICA.—One of these is a tree of the N. O. Apocynaceæ, viz., *Mascarenhasia elastica*, K. Schum., which yields caoutchouc. Another is *Canarium Liebertianum*, Engl., the bark of which yields a resin that much resembles olibanum. Another is *Erythrophloeum guiniense*, Don., the wood of which is valuable and the bark contains erythrophloëin. The fruit of *Cordyla africana*, Lonr., yields an edible leguminous fruit.—*Notzbl. d. Berl. bot. Gart.*, 1899.

UNGANDA ALOES.—W. A. H. Naylor and J. J. Bryant (*Pharm. Jour.*, 1899, p. 296) find that Unganda aloes approximates in character and tests to Cape aloes.

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NOVEMBER, 1899.

A NOTE ON POWDERED DRUGS.

BY MELVIN WILLIAM BAMFORD, P.D.

In a paper published in the *Pharm. Zeit.*, 1898, p. 685, Dieterich has shown that the amount of ash yielded by the fine and coarse parts of the powder of certain drugs varies with the fineness of the powder. As to what these different powders consisted of, no mention whatever was made, so that we do not know whether they consisted solely or in part of parenchyma, epidermis, or any other tissues, or indeed foreign matter, as no microscopical examination of the different powders was made.

Although Dieterich did, in drawing his conclusions, state that he presumed this difference in ash was caused by the separation of tissues, and, therefore, the separation of their constituents, as crystals, alkaloids, etc., into the separate powders, this statement was made without any attempt being made to prove such to be the case. His experiments, therefore, simply proved this difference in ash, without assigning any definite cause for it. Dieterich did not show that fine and coarse powders of the same drug did not yield the same percentage of ash, although this might have been assumed from the results shown.

In order to be clear on these various points, and to determine, if possible, the causes underlying them, the author of the present paper, at the suggestion of Professor Henry Kraemer, carried out a number of experiments in the Microscopical Laboratory of the Philadelphia College of Pharmacy. In the first of these experiments senna was the drug used.

Senna leaves were cut up so as to all go through a No. 8 sieve,

and another lot ground so as to all pass through a No. 80 sieve. Two ash determinations on each of these powders resulted as follows:

No 8—(a) 10.19 per cent.; (b) 9.89 per cent.

No. 80—(a) 10.50 per cent.; (b) 9.93 per cent.

Allowing for discrepancies which must occur in such work, these results show that practically there is no difference in the percentage of ash.

The next determinations were made on three powders, Nos. 8, 30 and 80, which were obtained by separating a coarsely ground powder of the same lot of senna into powders of the above degrees of fineness. Two ash determinations were made on each of these powders, with the following results:

No. 8—(a) 10.17 per cent.; (b) 10.20 per cent.

No. 30—(a) 10.85 per cent.; (b) 10.64 per cent.

No. 80—(a) 10.96 per cent.; (b) 10.70 per cent.

These results, although showing a slight increase with the fineness of the powder, do not show anything like the same increase shown in Dieterich's work.

Since this difference was supposed to be due to the different tissues in the several powders, it was thought desirable to use some drug in which the tissues could be separated. This drug was found in ipecac. A lot of ipecac was procured and in a part of it the bark was separated from the wood. (Incidentally it was found that the bark constituted about 80 per cent. of the drug.) The percentage of ash found in these parts, two determinations being made in each case, was as follows:

Bark—(a) 2.44 per cent.; (b) 2.45 per cent.

Wood—(a) 1.69 per cent.; (b) 1.47 per cent.

It will be noticed here that the bark yields about 1 per cent. more ash than the wood, which is partly due to the fact that all the crystals of calcium oxalate are contained in the bark, and partly to another fact which will be shown later.

Next a quantity of the same drug, ground to a coarse powder, was divided into powders of different degrees of fineness. Ash determinations were then made on two of these powders, that which passed through a No. 80 sieve and that which did not pass through a No. 20 sieve. These resulted as follows:

Coarser than No. 20—(a) 2.14 per cent.; (b) 1.90 per cent.

No. 80—(a) 12.35 per cent.; (b) 12.54 per cent.

These results show a remarkable difference in the percentage of ash, and to determine, if possible, the cause, the powders were examined microscopically. The coarse powder was found to consist principally of woody tissue and a small percentage of bark. There was practically no foreign matter present in this powder. The No. 80 powder was found to consist of bark principally, raphides of calcium oxalate, and quite a large percentage of foreign matter, most of which, on further examination, proved to be particles of sand. This led to still further examination to determine the cause of the presence of sand. In the package containing the crude drug, and evidently separated from it in handling, was found a quantity of a fine powder which, on examination, proved to be largely sand and other foreign matter. Some of the root was then carefully scraped so as to remove from the surface any adherent particles of dirt, and these scrapings were also found to be composed principally of sand.

Naturally, when the drug was powdered these particles of sand and other foreign matter were separated and passed through the sieve with the finest part of the powder. Since the fine powder used in the above determinations was but a small part of the whole powder, the presence of this inorganic matter must necessarily increase the percentage of ash very greatly, and hence the remarkable difference found in these powders. And also this matter being all attached to the bark would increase the ash percentage of the bark over that of the wood. This has been practically shown in the above estimations.

The senna used in these experiments was an especially clean lot of the drug, and possibly an explanation of the great difference in these results and those of Dieterich may be found to be that the drug used in his experiments contained foreign matter of the same nature as that found in the ipecac used for these experiments.

BOTANICAL SOURCE OF MYRRH.—From specimens collected by Mr. and Mrs. Philips it appears that the plant recognized by the Somalis as the source of myrrh is that figured in Bentley and Trimen's "Medicinal Plants."—*Ph. Jour.* (London), 1899, p. 295.

NEW EUCALYPTUS SPECIES.—R. T. Baker ("Proc. Linn. Soc. N. S. W.," 1898) describes two new species: (1) *E. dextropinea*, the volatile oil (0.85 per cent.) of which consists largely of a dextro-rotatory pinene, eucalyptol being absent. (2) *E. lævopinea*, the volatile oil (0.85 per cent.) being made up largely of lævo-rotatory pinene, but contains neither eudesmol nor eucalyptol.

FURTHER WORK UPON THE ESTIMATION OF ALKALOIDS AND THE ASSAY OF ALKALOIDAL DRUGS.¹

BY H. M. GORDIN AND A. B. PRESCOTT.

In a paper presented by us a year ago,² we offered a method for the volumetric estimation of alkaloids by use of standard solution of iodine. We then reported upon the method for use with six alkaloids, morphine, atropine, strychnine, brucine, caffeine and aconitine. And we had succeeded in making the method a trustworthy and convenient one for five of these alkaloids,³ all those just named except aconitine. In each instance we had obtained in purity the higher periodide of the alkaloid, the one formed in our method of estimation, and had found the analysis of this periodide to give a molecular factor which was closely verified when put to the volumetric test. A volumetric method, of course, requires that the alkaloid be first brought into aqueous solution, nearly free from other matters. In the case of opium we had reported a method of extraction from the crude drug, together with the volumetric estimation of the morphine, in one assay process, having advantages of a nearer approach to complete recovery of the morphine content, and of promptness of operation. As to methods of extraction for other crude drugs, we mentioned a year ago that we had work in hand, and said that it was too early, as yet, to make definite proposals for pharmacopœial adoption of the method for any of the alkaloidal drugs or galenicals.

During the past year we have worked upon the application of the iodometric method to five more alkaloids, emetine, hydrastine, berberine, colchicine and quinine, and have already made the method entirely satisfactory for emetine, berberine and hydrastine. For berberine the estimation, though iodometric in one sense, rests on the formation of an insoluble hydriodide instead of a periodide, and re-

¹ In the work of Research Committee D, Section 2, Committee of Revision and Publication of the Pharmacopœia of the United States, 1890-1900. Read at the meeting of the American Pharmaceutical Association, September, 1899.

² "Certain Alkaloidal Periodides and the Volumetric Estimation of Alkaloids as Higher Periodides." A. B. Prescott and H. M. Gordin, "Proc. Am. Phar. Assoc.," 1898, p. 355.

³ For caffeine the method had been completed, with analysis of the periodide and other perhalides, by Gomberg, in this Laboratory, in 1896.

quires volumetric solutions different from those used with all the other alkaloids. We have also elaborated the volumetric process to the separation of strychnine from brucine. In the case of colchicine, the formation of a uniform periodide presented difficulties, but we hope to return to the investigation of this alkaloid, as well as to that of aconitine. Respecting quinine, we have in hand work upon its separation, but we are not confident of making any improvement over existing methods.

To work out a general method of analytical extraction of alkaloids from crude drugs, bringing the alkaloids of drugs completely into solution suitable for almost any volumetric or gravimetric estimation, has been a problem undertaken in our work during the past year. We were invited to this problem, in fact, by the unexpected advantages of the procedure we had adopted for extraction in opium assay, and by a desire to adapt the same procedure to other and ordinary alkaloidal drugs. The opium assay process we have materially improved this year. In result we now desire to offer such a method for the extraction of alkaloids in process of estimation, especially for use in volumetric estimation, whether such volumetric way be on the iodometric plan, or upon the alkalimetric plan, the latter having received a quite favorable consideration at the hands of analysts.

In this paper we beg leave to give some further experimental data, upon which we have based the methods which we propose for alkaloidal assay, and therewith very brief discussion of the claims of these methods in comparison with others.

In an accompanying paper (See AMER. JOUR. PHARM., 1899, p. 462) we give, in short compass, the bare directions for assay, namely, for alkaloidal extraction in general, for iodometric estimation in general, with a list of iodine factors for alkaloids, the assay of *nux vomica*, of *ipecacuanha* and opium assay.

We give the simple directions for assays, disencumbered of reports of our experimental work, for the easier use of analysts while under the working pressure of industrial laboratories, where all devices for the valuation of drugs ought, if possible, to come to trial before adoption into the text of a national pharmacopœia. But whether for consideration by any national committee of revision or for the attention of individual chemists anywhere, it is our desire to give, if we can, some addition to the resources of analysts, well

knowing how portentous are the demands now made, both by legal enactments and by commercial contracts, upon the faithful services of the devoted analyst, who is not seldom called upon to do without delay more than all the world of research has ever done before him.

THE PERIODIDES OF EMETINE.¹

Emetine seems to form two periodides, according to whether the iodine is added to the alkaloid or *vice versa*, but owing to lack of material we have only isolated and analyzed one, namely, the higher periodide. The emetine used was obtained from Merck & Co. The periodide was made by pouring 200 c.c. of a solution of emetine in acidulated water, this solution containing about $\frac{1}{2}$ per cent. of the alkaloid, into about 500 c.c. of a solution which contained about 1 per cent. of iodine with $1\frac{5}{10}$ per cent. of potassium iodide, and was strongly acidulated by hydrochloric acid. The mixture was shaken till the supernatant liquid became perfectly transparent, the precipitate was separated by means of the pump, quickly washed with cold water and then dried, first on porous plates and then in vacuo over sulphuric acid.

Thus obtained, the periodide is a dark brown powder, hardly soluble in benzol, ether or chloroform, quite soluble in alcohol, and very soluble in a mixture of four parts of alcohol and one of chloroform. The chloroform greatly increases the solubility of the periodide in alcohol, though chloroform alone hardly dissolves it. So far we have not been able to recrystallize it. On evaporation of the solvent a viscous mass is generally left. Authorities differ with regard to the formula of emetine, as follows:

Lefort and Wurtz ²	$C_{28}H_{40}N_2O_5 = 482.98$
Glenard ³	$C_{30}H_{44}N_2O_4 = 494.96$
Kunz ⁴	$C_{30}H_{40}N_2O_5 = 506.92$
Paul and Cownley ⁵	$C_{15}H_{22}NO_2 = 247.48$

Our periodide corresponds best to the formula of Lefort and Wurtz. Adopting that, provisionally, we have an emetine hydriodide heptiodide, $C_{28}H_{40}N_2O_5 \cdot HI \cdot I_7$.

¹ Included in a paper published in *Phar. Review*, Vol. 17 (1899).

² *Ann. Chim. Phys.* (5), 12, 247.

³ *Ibid.* (5), 8, 233.

⁴ *Arch. d. Pharm.*, 225 (1887), 461; 232 (1894), 466.

⁵ *Pharm. J.* (3), 24, 61.

For the estimation of the additive iodine the periodide was dissolved in chloroform mixed with alcohol and titrated with standardized thiosulphate, using starch as indicator. It is best to add first an excess of the thiosulphate solution, then add considerable water, when the excess is titrated back with standardized iodine. For the total iodine the periodide is dissolved in a little chloroform mixed with a few drops of alcohol; powdered zinc is then added and the mixture kept on a water-bath till effervescence (from the action of zinc on the chloroform) ceases. To the mixture, when cold, ammonia water is added, and the iodine in the zinc and ammonium iodide is estimated exactly as described in the analysis of morphine tetraiodide.¹

For additive iodine, 0.1492 gramme of the periodide gave 0.0880045 gramme iodine, and 0.122 gramme gave 0.0727250 gramme iodine.

	Calculated for $C_{28}H_{40}N_2O_5.HI.I_7$.	Found.
1	59.24	59.98
2	59.24	59.61

For total iodine, 0.1313 gramme of the periodide gave 0.0890502 gramme iodine, and 0.12095 gramme gave 0.0818797 gramme iodine.

	Calculated for $C_{28}H_{40}N_2O_5.HI.I_7$.	Found.
1	67.69	67.82
2	67.69	67.69

From these results we draw the provisional iodine factor of the alkaloids of ipecacuanha, 1.00 of iodine = 0.55 of alkaloids.

PERIODIDES OF HYDRASTINE.²

The higher periodide is of a very dark brown color, very difficultly soluble in ether, benzol or cold chloroform, more easily in hot chloroform and in alcohol, and very easily in a mixture of alcohol and chloroform, or alcohol and ether. It melts in hot water. Attempts to crystallize it failed. It is obtained when the dilute alkaloid solution is slowly added to a large excess of iodine dissolved with potassium iodide in water. So made, it is constant

¹ "Proc. Am. Pharm. Assoc.," 1897, p. 340, *et. seq.*

² This body was reported upon in full in an article in AM. JOUR. PHARM., 71, 257 (1899).

in composition, hydrastine hydriodide penta iodide, as determined by a preparation and analysis as described in previous papers.¹

	Calculated for $C_{21}H_{21}NO_6HI.I_5$.	I.	Found. II.
Additive iodine	55.43	55.30	55.34
Total iodine	66.52	66.86	66.06

The lower periodide of hydrastine, formed when the iodine solution is added to the alkaloidal salt solution, is from light brown to dark brown in color. It is not constant in composition, and was only obtained as an approach to a triiodide. Prepared and analyzed, it gave figures as follows:

	Calculated for $C_{21}H_{21}NO_6HI.I_2$.	I.	II.	Found. III.	IV.
Additive iodine	33.22	35.76	36.07	36.33	36.02
Total iodine	49.83	50.01	49.74	—	—

IODOMETRIC ESTIMATION OF HYDRASTINE.²

The exclusive formation of the hexiodide is insured by slowly adding a weak alkaloidal solution to a large excess of the iodine solution, and proceeding as directed for other iodometric estimations.³ The iodine factor for hydrastine is 0.60403 ($382.14 : 5 \times 126.53 :: 0.60403 : 1$). This factor was verified in the estimation of solutions of 0.3 per cent. and of 0.15 per cent. of hydrastine.

ASSAY OF HYDRASTIS.

Ten grammes of the finely powdered hydrastis are rubbed up to a paste with a few cubic centimetres of a mixture of alcohol and stronger ammonia, each, 5 c.c., and ether, 30 c.c., in an 8-ounce screw-top ointment jar, and a few cubic centimetres more of the same mixture are then added, so as to have the powder well covered with liquid. The small pestle is then left inside, and the jar, well covered, is set aside over night. The jar is then opened, put into a good current of air till the odor of ammonia has disappeared, and then in a vacuum over sulphuric acid for about five or six

¹ "Proc. Amer. Pharm. Assoc.," 1898, pp. 358, 364.

² We are indebted to Prof. John U. Lloyd for a specially prepared sample of hydrastine. We had also a sample in a lot of pure alkaloids furnished by Merck & Co., and the latter agreed very well with the former in the quantitative results.

³ See an accompanying paper, "Directions for Alkaloidal Assays," *AMER. JOUR. PHARM.*, 1899, p. 462.

hours. The powder is then put into a filter-paper cell, placed in a Soxhlet extraction apparatus, the jar rinsed out several times with powdered glass, or, in the absence of this, with coarsely powdered barium nitrate, the rinsings added to the Soxhlet, the latter connected with an Erlenmeyer flask containing about 40 or 50 c.c. absolute ether, and the extraction conducted in the usual way, till a few drops after evaporation of the ether and acidulation give no reaction with Mayer's or Wagner's reagent. The ethereal extract will be found to have only a very slight yellow color. The Erlenmeyer is then detached from the Soxhlet, the ether poured out into a flat evaporating dish, the Erlenmeyer washed out several times with water containing about 2 per cent. sulphuric acid, the washings added to the contents of the evaporating dish, and the latter put into a draught at about 30° C., till the ether has disappeared.

The contents of the dish are poured into a 100 c.c. flask, the dish washed, the washings added in the flask, and the latter filled up to the 100 c.c. mark. The solution containing hydrastine sulphate, and of which 10 c.c. represent 1 gramme of the root, is used for the estimation of hydrastine.

For the iodometric estimation 20 c.c. of the filtered solution (representing 2 grammes of the drug) are run from a burette into a 100 c.c. flask, containing 20 or 30 c.c. of a standardized solution of iodine of any known strength (that in the neighborhood of 1 per cent. is the best), and the analysis carried out exactly as described in the accompanying paper (*AMER. JOUR. PHARM.*, 1899, p. 462). From the amount of iodine consumed the amount of hydrastine is deduced by using the factor of the hydrastine hexipdide, *i. e.*, 0.60403 of hydrastine for one of iodine consumed.

For a gravimetric estimation another portion of 20 c.c. of the filtered solution is run into a separator and the hydrastine shaken out with benzol and ammonia, all the coloring matter remaining in the aqueous fluid, and a perfectly colorless solution of hydrastine in benzol is obtained. The benzol solution is then filtered through a small filter into another separator, the first separator and filter washed with benzol, and the hydrastine again shaken out with water acidulated with sulphuric acid. At last, from the watery solution, the hydrastine is shaken out with ether and ammonia, the ether poured into a tared beaker and slowly evaporated in a dark place. After drying in a vacuum over sulphuric acid and paraffine,

the beaker is weighed. The hydrastine is left in perfectly white crystals, and only a slightly yellowish tint can be seen on the sides of the beaker. This tint is probably due to traces of canadine, which becomes yellow¹ on exposure to light. Of course, instead of shaking out, the method of perforation may be used if preferred.

For the estimation of berberine a current of dry air is passed through the Soxhlet till all the ether is removed, the Soxhlet connected with an Erlenmeyer containing 40 or 50 c.c. of alcohol, and the extraction continued till the alcohol comes out colorless. The alcoholic extract, containing berberine and considerable quantities of extractive matter, is poured out into an evaporating dish, the Erlenmeyer washed out with hot water and a little dilute acetic acid, the washings added to the evaporating dish, and the latter kept on a water-bath, adding water from time to time till all the alcohol has disappeared. A little more diluted acetic acid is now added, the dish covered, and when completely cold its contents are filtered into an Erlenmeyer having the capacity of about 300 or 400 c.c.²

Six to eight c.c. of acetone are added to the contents of the Erlenmeyer, of which the washings of the dish and the filter have been added, and then a 10 per cent. solution of sodium hydrate is added, drop by drop, till the precipitate first formed ceases to disappear on shaking, and the liquid acquires a strongly alkaline reaction. The Erlenmeyer is then stoppered and shaken in circular direction for about ten or fifteen minutes, and then set aside in a cool place for two or three hours. The berberine-acetone³ separates out in crystals, some of which adhere to the sides of the vessel. The supernatant liquid is then poured on a small filter, the precipitate washed once or twice by decantation, and then on the filter, till the washings are colorless. The filter is then pierced

¹ E. Schmidt, 1894; *Arch. d. Pharm.*, 232, 141.

² In the remaining procedure, the simplest way would be to precipitate the berberine with hydrochloric or nitric acid, but in this case a considerable amount of extractive matter contaminates the precipitate, and the estimation would fall out too high, though the error in this respect might be compensated in some extent by the solubility of the hydrochloride or nitrate in water. But the best way is to purify the berberine by converting it into berberine-acetone, regenerate the alkaloid by means of sulphuric acid, and then estimate it volumetrically by standard potassium iodide.

³ Gaze, *Arch. d. Pharm.*, 1890, 607.

through, and, by means of the wash bottle, the precipitate is returned to the same Erlenmeyer in which the precipitation took place. In this way all loss is avoided. To the precipitate about 4 or 5 c.c. of a 5 per cent. solution of sulphuric acid is now added, and then water enough to make about 100 or 200 c.c. The Erlenmeyer is now put into hot water, when the precipitate will completely dissolve in the course of a few minutes. The solution is now poured into a long-necked flask, washing the Erlenmeyer several times, the flask put on an asbestos plate and kept very gently boiling for about an hour and a half or two hours, adding hot water from time to time if necessary.

The flask is now cooled and its contents poured out into a litre measuring flask,¹ into which there has been previously taken from a burette 100 c.c. of twentieth normal potassium iodide. The flask is washed several times, the washings added to the measuring flask, and the latter filled up to 1,000 c.c. and set aside over night. 500 c.c. are now filtered off into another litre flask, 50 c.c. of twentieth normal silver nitrate and nitric acid are added to the flask, which is filled up to 1,000 c.c., well shaken, filtered, and 500 c.c. of the filtered liquid titrated back with fortieth normal ammonia sulphocyanate, using ferric alum as indicator. Twice the number of cubic centimetres of the sulphocyanate solution used is equal to the number of cubic centimetres of the potassium iodide solution consumed by the berberine, representing 10 grammes of the hydrastis root. By multiplying the number of cubic centimetres of twentieth normal potassium iodide consumed by 0.167125, the percentage of anhydrous berberine in the root is obtained, as 1 c.c. of the potassium iodide solution is equal to 0.0167125 of berberine.

In our assay of *Hydrastis canadensis* three samples of powdered hydrastis were treated in the way described. The berberine was estimated volumetrically, the hydrastine both iodometrically and gravimetrically.

	For Hydrastine, Iodine Consumed by 2 Grammes of the Root.	Iodometric.	Hydrastine. Gravimetric.
1	0.0760015	2.29	2.29
2	0.0772012	2.33	2.30
3	0.0777770	2.35	2.28

¹ The berberine hydriodide being extremely bulky, the error arising from the space occupied by the precipitate is reduced to a minimum by using a large flask.

For Berberine. Number of C.c. of $\frac{N}{20}$ KI Consumed by 10 Grammes of the Root.		Berberine Anhydrous.
1	15.1	2.52
2	15.3	2.55
3	14.8	2.47

RESPECTING THE OPIUM ASSAY.

Last year we reported¹ a morphimetric assay of opium, the chief features of which were:

(1) Extraction of the drug by a special method of percolation to separate the morphine.

(2) The volumetric estimation of the extracted morphine by standard iodine. In this method only 1 gramme of opium is taken.

As a result of our further work we now offer some additions to this process of opium assay, as follows:

(1) A more desirable solvent for the extraction of the morphine.

(2) An adaptation to the use of standard acid for those who prefer it instead of iodine, in the volumetric determination of the morphine. This, however, makes it advisory that 3 grammes of opium be taken instead of 1 gramme.

Having additional experience, we present a new statement of the directions for the work, in the accompanying paper entitled "Directions for Certain Alkaloidal Assays." (See AMER. JOUR. PHARM., 1899, p. 462.)

In respect to the deficiencies of ordinary opium assays, the following observations may be made:

(1) In most of the methods there is no proof that the opium is completely exhausted.

(2) It is not proven that the narcotine is fully removed, and the same may be said of the most of other opium alkaloids beside morphine.

(3) The heat of evaporation is liable to affect morphine injuriously, easily oxidizable as it is.

(4) The crystalline precipitation of morphine is not complete, and it is not known exactly how much of it is left in the mother liquor.

(5) Some other matters are carried down with the precipitated morphine and weighed as such.

¹ *Pharm. Arch.*, 1, p. 121; "A. Ph. A. Proc.," 1898, p. 340; *Jour. Am. Chem. Soc.*, 1898, p. 724.

Three assays of a sample of opium, which by the method of the U.S.P., 1890, was found to contain 14 per cent. of morphine, were carried out by the method described in the accompanying paper. Both the alkalimetric and iodometric methods, agreeing quite well with each other, gave results considerably above those obtained by the U.S.P. method.

Opium Taken in Grammes.	$\frac{N}{20}$ Acid Con- sumed by 2.5 Grammes Opium.	Grammes of Iodine Consumed by $\frac{1}{2}$ Gramme Opium.	Per Cent. Morphine Found.	
			Alkalimetric.	Iodometric.
1.3	31.1	0.116652	17.66	17.50
2.3	31.5	0.116672	17.90	17.50
3.3	31.3	0.116590	17.78	17.49

HOT EXTRACTION INSTEAD OF COLD PERCOLATION IN THE ASSAY OF OPIUM.¹

Instead of extracting the morphine from the opium by cold percolation with an alcohol-chloroform mixture as here described, hot extraction with chloroform alone in a suitable extraction apparatus may be used. Though morphine is very slightly soluble in cold chloroform, it dissolves much more easily on the application of heat.

This has been shown by Florio,² and verified by us. The most suitable apparatus for this case is undoubtedly that of Dunstan and Short,³ as it can be used for cold percolation as well as for hot extraction. If this method of extraction be preferred, the opium mixed with the sodium chloride is placed in this apparatus and exhausted by cold percolation with benzol, as described above. A current of dry air is then passed through the tube till the powder becomes dry, which can be seen by the light color that the powder assumes, or by the fact that the tube ceases to feel colder than the surrounding medium, the apparatus then connected with a small round-bottomed flask containing 40 to 50 c.c. of chloroform, and the powder extracted on a water-bath till exhaustion is complete. Care should be taken that only a small surface of the bottom of the flask be heated, and that a layer of solvent be constantly on top of the powder. Most of the chloroform can then be distilled off and

¹ See the section on the hot extraction method as an alternative to cold percolation, in the general process for analytical extraction of drugs in "Directions for Certain Alkaloidal Assays." (AMER. JOUR. PHARM., 1899, p. 462.)

² *Gaz. chim. Ital.*, 13, 496.

³ *Pharm. Jour.* (3), xiii, 664.

the balance evaporated from a shallow vessel. The residue in the evaporating dish and that left in the flask are then taken up with acid (standardized if an alkalimetric assay is intended) and the operation finished as above. If only an iodometric assay is desired, the acid solution is made up to a given volume, shaken with a small quantity of calcium hydrate, and the filtered half of the solution treated with iodine as above. In this case only 1 gramme of opium need be used.

COMPARATIVE MERITS OF IODOMETRIC ESTIMATION.

Of the various devices which have been resorted to in the estimation of alkaloids, two general methods are especially worthy of regard because of their directness and simplicity, namely, the gravimetric method and the alkalimetric method.

The gravimetric method, using chiefly solvents to separate the alkaloid and weigh it uncombined, has the advantage of extreme simplicity of principle, but the disadvantage of depending upon solvents for separation from non-alkaloidal matters, a separation lacking in exactness and requiring repetitions which take up much time. The result is apt to be a compromise between the loss of alkaloid left behind in the solutions and the gain in weight by impurity in the final product.

The alkalimetric method is certainly based upon the best of principles, and so far as it can be readily executed with exactness, it should have the preference. Unfortunately, the combination of alkaloids with acids is not a reaction quickly and sharply defined. The presence of ammonia must be excluded. The end-reaction depends so much upon the choice and quality of the indicator, the personal equation of the operator and the light where the observation is made, that results are often in doubt, or ought to be.

The iodometric method, in the instances of alkaloids which form distinct higher periodides insoluble in excess of the reagent, has claims as follows: It is based upon fixed chemical proportions deduced from analyses of the products of the reaction; the end-reaction is very sharp indeed; the actual exactness of the estimation has been verified, and the volumetric reagents required are among those most commonly in use and of earliest introduction into the pharmacopœias. The estimation is done in an acid solution, and ammonia or other alkali does not interfere.

COMPARISON OF IODOMETRIC AND GRAVIMETRIC RESULTS.

NUX VOMICA.				
Drug.	Quantity Taken for Assay. Grammes.	Iodine Consumed.	Percentage of Alkaloids. Iodo- metric.	Gravi- metric.
Iodometric I	I	0'0526816	2'52	—
	2	0'0526725	2'52	—
Gravimetric I	I	*	—	2'73
	2	*	—	2'73
BELLADONNA ROOT.				
Iodometric I	2'5	0'0459179	0'52	—
	2'5	0'0459263	0'52	—
Gravimetric I	2'5	*	—	0'51
	2	*	—	0'51
BELLADONNA LEAVES.				
Iodometric I	5	0'0478286	0'27	—
	5	0'0475922	0'27	—
Gravimetric I	5	*	—	0'28
	2	*	—	0'28
IPECAC ROOT.				
Iodometric I	2	0'0957764	2'61	—
	2	0'0986633	2'69	—
Gravimetric I	2	*	—	2'63
	2	*	—	2'62

*Alkaloids shaken out and weighed.

ON THE USE OF "WOOD PULP" SHEETS AS A SUBSTITUTE FOR FLAXSEED MEAL AND OTHER SUBSTANCES IN POULTICES; ALSO, A FEW OTHER USES FOR THE MATERIAL.

BY FREDERICK T. GORDON, U. S. Navy.

As an introduction to an article which I will endeavor to make as practical and comprehensive as possible, I want to say a few words on the sentimental side of the subject. As an "apothecary" in our naval service, the dollars and cents side of the topic touches me very slightly, my interest is professional, but I know that these same dollars and cents are all-important to my confrères in civil life. Therefore, as an individual and also as a member of a little corps for whose benefit the "druggists" have done so much of late, it gives me the greatest possible pleasure to be able to suggest an addition to the ways and means by which our druggist friends may add to their stock of useful articles and to their profits as well.

That I have good reason for believing that there *is* a money side, as well as a professional one, to this new use for wood pulp, is proven to me by the widespread interest my suggestions have aroused. About two weeks ago the *Medical Record* (New York) published a short article of mine on this subject; since then I have received a number of inquiries from both doctors and druggists in all parts of the country as to details, cost, place of manufacture, etc. I plead as an excuse for mentioning this personal matter that it shows conclusively that there is a demand for something to replace flaxseed meal in poultice-making, and that "wood pulp" seems to come very near to the ideal substance. Therefore, I think that the subject is worthy the attention of the druggist. He can procure this material and supply it to his clientele of physicians, as well as to the regular trade.

As regards cost and source of supply of the article I regret that I cannot give much definite information on this point. The firm from whom I procured the sheets with which I experimented is the McDonald Paper Mills, Manayunk, Philadelphia, Pa., and, as far as I can remember, the cost was very nominal. I do know this, that any druggist who is desirous of going into this subject can obtain full information as to cost, etc., from the firm from whom he buys his paper. The sheets of wood pulp can be had in any thickness and in any size if a demand is created for them, as this is a common way in which the wood pulp is shipped from the mills to the paper makers. There are a number of pulp mills in the New England States, Maine especially.

Before I begin my summary of the uses to which the wood pulp sheets can be put, I must emphatically state that the looser the texture of the sheets the better will be the results. A closely pressed sheet will take longer to make use of, and will not be so satisfactory; the crude sheets, just as they come from the mills, are the best. I prefer the so-called "unbleached pulp," since the "sulphite pulp" sometimes contains a trace of sulphites and other bleaching chemicals.

THE USES OF WOOD PULP SHEETS.

As a Substitute for Flaxseed Meal for Making a Poultice.—Cut a sheet of the pulp to a size approximate to the surface to be covered, soak the sheet in *hot* water until it has become thoroughly softened,

then lightly wring it out, very lightly, and apply. The wood pulp sheet will absorb and hold from four to five times its weight of water, and, since heat and moisture are the desiderata in poultices, we have them here in a simple, cleanly form. No cloths are needed, no cooking, no stirring and spreading on cloth, just a soaking in hot water. And the nicest part is the total absence of the mess inevitable to making flaxseed meal poultices, although there is, too, a great economy of time and trouble. I sometimes find it advisable to put a piece of oiled muslin over the sheet to help retain the heat and moisture.

When the "poultice" begins to get cold, take it off, wring out the water and soak it again in hot water, and so on, indefinitely. I have used the same sheet of wood pulp for two days' poulticing, in the hands of an ignorant man at that, my instructions to him being "to soak the plaster in hot water whenever it got cold, and put it on again," and he said it "worked all right." By the way, every physician who has had the annoyance and trouble of being compelled to leave an all-important matter of poulticing to an ignorant person will appreciate a way that will allow of no loophole for mistakes and failures.

Any desired degree of softness can be had by regulating the time of soaking. As a precaution, *be sure and soak the pulp long enough at the start.*

If it is desired to have an antiseptic action in connection with the poulticing, mercuric chloride, carbolic acid, or any water-soluble germicide can be dissolved in the water to the proper strength, and then the drug will penetrate into every portion of the sheet and give you an antiseptic dressing as well as a poultice.

As far as I have experimented, I know of no drug possessing antiseptic properties which is incompatible with wood pulp, as it is almost pure cellulose. To sterilize a dry sheet, place it in an ordinary stove oven and leave it there a few moments; it will not hurt the pulp if it does kill the germs. And, by the way, there is very little germ material in wood pulp; the most omnivorous bacteria can find little to eat in such a substance.

In lieu of a charcoal dressing for foul ulcers and sores, char the surface of a sheet, say to a quarter of an inch, scrape the burnt side lightly, then apply. You will then have a deodorant as well as absorbent dressing.

Wood pulp, when dry, will absorb melted ointments and oils. Therefore, menthol, thymol, carbolic acid or similar substances can be dissolved in the oil or ointment and the sheets of pulp soaked in the mixture, giving a cleanly and convenient way of applying a salve or antiseptic unguent. Any desired degree of impregnation can be had by regulating the amount absorbed by the pulp; if an excess is not used, the sheet will also absorb the discharges from the wound or sore. By scraping the sheet down to a pulpy mass, a substance is obtained which can be used to hold any salve or plaster; this can be moulded to any desired shape, say for vaginal tampons or suppositories. The *dry* mass may be used as a "sponge-tent," too, as pulp is very absorbent.

As a Splint.—Thick sheets of wood pulp, if soaked sufficiently to soften them, can be moulded to fit any limb or surface; when the sheets become dry, they will be found to retain their shape perfectly and to possess a remarkable sustaining power and stiffness.

A thin layer of plaster-of-paris may be sprinkled between two thin sheets, or a thick one split; by moistening the surfaces sufficiently, and applying them while moist, a most excellent plaster support will be had. It can, of course, be shaped in any manner desired, and when it is to be removed, there will be very little of the usual pain and annoyance incidental to the ordinary plaster bandage.

Other Uses.—In case of a shortage of lint or cotton, the physician can scrape down the sheets of wood pulp he carries in his pocket, and, after sterilizing the fluffy mass for a few minutes in his patient's stove, he has a most excellent substitute for the above articles.

As an Ice-cap.—Soak the wood pulp in ice water, mould to shape of head and apply; renew as with hot poultices. This method gives a very light and comfortable ice-cap, which will stay on and not fall off.

In Pneumonia.—A favorite treatment of many physicians for the early stages of pneumonia is to apply a jacket poultice around the chest. Cut the sheets of wood pulp to size, using at least an inch of thickness, soak in hot water until enough is absorbed, apply, cover with oiled muslin to retain heat and to keep clothes dry, keep in place with a few turns of a bandage. As before mentioned, the great advantage of wood pulp lies in its convenience and freedom from "messiness." Any one who has ever made a "jacket poultice" will appreciate this use of pulp.

As regards transportation, a very important topic for physicians in thinly-settled districts, it may be said that the sheets of wood pulp are very light, and quite a quantity can be carried under the buggy seat. When you have *it*, you have cloths, material, apparatus; in fact, everything for poultices except the hot water. The only drawback is its bulk, but one cannot get perfection in every feature.

I have briefly outlined these few of the many uses to which wood pulp can be put. Probably there is not a single druggist who cannot suggest many more and better uses now that his attention is drawn to this material. There are numerous uses to which the pulp can be put in every store and laboratory, as, for filtering cloudy elixirs, wiping up grease and dirt, a non-conducting surface to rest pots and crucibles on, as a cover for a steam heater or condenser, etc.

As a commercial article, permit me to make these suggestions: For the medical profession, keep an assorted supply of the sheets of wood pulp, of course acquainting them with the uses and virtues of the material by actual demonstration. They will be quick to appreciate the cleanliness and convenience of wood pulp as an aid to their practice, and will, no doubt, make much use of it.

THE VALUATION OF VEGETABLE DRUGS AND FOODS.¹

BY HENRY KRAEMER.

After the identification of a drug or food, the next question to be considered is its quality or value in a commercial sense. While the identification of drugs and foods is universally recognized as being of importance in handling them, yet it is also apparent that commercial success is dependent upon something more than this, *i. e.*, the intrinsic worth or value of the drug or food to the consumer. In times that have passed there was a kind of personal knowledge of drugs and foods which enabled one readily either by reason of appearance, odor, taste or the sense of touch, to pronounce upon the value of them. As to whether our system of education is the cause of men not endeavoring to obtain this "personal knowledge" of drugs and foods, or whether these tests are not

¹ Presented in abstract at the meeting of the American Pharmaceutical Association, September, 1899.

sufficient for the finer determinations of quality, or whether men have not the inclination to follow in the footsteps of their fathers, and patiently acquire this art for testing these products, we cannot say. Probably a combination of all these factors is at work producing the modern analysts.

Mr. Chas. H. La Wall,¹ in a paper on "Pharmacopœial Preparations from an Economical Standpoint," has shown in at least one instance how impracticable it is, financially speaking, for a pharmacist (compared to the manufacturer) to test his chemicals, preparations, etc. It is apparent that the Committees on Revision of the U.S.P. and other pharmacopœias appreciate the difficulties which attend the testing of chemicals and drugs purchased by the retail pharmacist, and very wisely have proceeded very slowly in introducing assay methods and tests which, though valuable and necessary to the manufacturer, may be but little, for economic and other reasons, employed by the retail druggist. The question arises: Is it possible for methods to be devised or accepted by the Revision Committee of the U.S.P. which can be employed practically by the pharmacist? Are there any methods for some of the more potent as well as other drugs, which he can employ quickly, or at the most without great expense, which will express to him their value? Is it possible to use smaller quantities and secure quantitative results that are as valuable as when larger amounts of the drug are employed? Are there other methods besides those of chemical assay that may be employed with equally as good results? The writer is of the opinion that a large number of general principles may be laid down and which can be worked out so as to make the subject of the valuation of vegetable drugs practicable, from an economical standpoint, to those who are properly qualified to dispense drugs, etc.

In the identification of drugs or foods certain characteristics are revealed, such as color, odor, appearance or impressions upon the sense of touch which are of more or less qualitative value, indicating care in gathering and storing, preparation for the market, etc. For their quantitative valuation, however, other means that are much more complicated and laborious are employed.

By the quantitative valuation of drugs and foods is ordinarily

¹AMER. JOUR. PHARM., 1899, p. 64.

understood processes involving chemical assay. The advantages of, and objections to, this mode of the valuation of drugs are too well known for me to treat of them at this time. It must be said, however, that from here and there have come evidences that the valuation of some drugs is best ascertained by other means than by chemical assay. Dr. Squibb has recommended the physiological test for aconite and its preparations. Remington (*Practice of Pharmacy*, p. 1056) says, under cantharides, that "The most satisfactory test of cantharidin is its vesicating property." Insect powders have by some experimenters been tested by placing a number of insects under the direct influence of the powder. A few years ago the author showed how, in some instances, as in the adulteration of cloves with pimenta, starch, etc., a quantitative microscopical method could be applied.

The question as to what is the quantitative value of vegetable drugs and foods is such an important one that the author has endeavored to broaden its scope, and to bring into co-operation all methods and tests that will in any way assist in the solution of the many problems connected with it.

The methods employed, or which are coming into use, may be conveniently grouped into five distinct classes, viz.:

- I. Chemical Methods.
- II. Physical Methods.
- III. Microscopical Methods.
- IV. Biological Methods.

V. Methods involving the use of the Polariscope and Spectroscope.

I. CHEMICAL METHODS.

For reasons which will be apparent later on, the author does not propose to consider the usual chemical assay methods. It may be stated, however, that he is fully aware of the value of the more or less definite and quantitative results which may be had by application of these methods in the examination of drugs. It may, moreover, be said that some of these methods, with the various modifications and improvements, will undoubtedly continue to be employed. The question, nevertheless, suggests itself, cannot general methods be devised which may not only be performed quickly, but which will, compared to a standard, *i. e.*, the best quality of drug, give results which will have a certain commercial significance?

(A) It has been the attempt of the author, under these methods, to work upon the least quantity of drug necessary to obtain appreciable reactions or characteristic results. For instance, in looking at the various drugs containing tannin, the question may be asked: "Is it not as satisfactory to take 100 milligrammes (0.100 gramme) of the drug and boil it for a few minutes with 20 c.c. of water and make a colorimetric test on this solution, using ammonio-ferric alum as a reagent, as it would be to make a solution of a larger quantity, and endeavor to obtain values either in terms of permanganate or by the hide method, etc.?" Every one who has worked on the estimation of tannins must appreciate how unsatisfactory are the quantitative estimations as usually carried on.

By boiling the various drugs containing tannin (as quercus alba, geranium, kino, catechu, galla and krameria) with water, in the amounts suggested above and diluting, as necessary, after adding a few drops of a ferric-ammonia-alum solution, solutions are obtained which may be compared in color to a standard of a given strength.

The following are the quantities used of the drugs mentioned above, and the results obtained therewith:

Take 0.100 gramme of quercus alba, boil with 20 c.c. of water; filter, and when cool take 5 c.c. of the solution, dilute with 25 c.c. of water; add ammonio-ferric alum solution, and there is produced a faint greenish-brown color, and in the course of a few hours a precipitate of the same color results.

Take 0.100 gramme of krameria, boil in the same manner with 20 c.c. of water. Filter, and when cool take 5 c.c. of the solution, dilute with 160 c.c. of water; add ammonio-ferric alum solution, and there is produced a grayish-blue color, corresponding in intensity to the coloration produced with quercus alba. It should be noted that a dilution of over six times is necessary to produce the same intensity of color.

Using an analogous procedure with geranium, it is found, if to 5 c.c. of the aqueous solution 180 c.c. are added, that, with a few drops of ammonio-ferric alum solution, a coloration of equal intensity to that of solutions of oak bark or krameria may be secured.

Five c.c. of the original solution of catechu requires to be diluted with 200 c.c. of water in order to produce, with ammonio-ferric alum, a solution of like intensity of color to solutions of the preceding drugs.

Kino requires that 300 c.c. of water be added to the 5 c.c. of solution of the drug to produce a corresponding intensity of color. Galls, on the other hand, require that to 5 c.c. of the original solution as many as 400 c.c. of water be added to obtain, with ammonio-ferric alum, a coloration that is equal in intensity to that of the solutions of the other drugs mentioned.

There is a slight difference in the color of the solutions obtained and a more marked difference in the color of the precipitates. Precipitates of oak bark, with ammonio-ferric alum, have a slightly greenish-brown color; those of geranium and galls have a light pinkish-blue color; those of catechu and kino are more or less grayish-blue or violet; and that of krameria has a slightly deeper gray color.

We find that the amount of water necessary to be added to 5 c.c. of the solution of the drug in order to produce solutions of equal intensity increases with the amount of tannin in the drug, as the following figures indicate :

DRUG.	Per Cent. of Tannin. (Approximately.)	Number of C.c. of Water be Added to 5 C.c. of Solu- tion of Drug (each C.c. of which has .005 Gramme of Drug).
Quercus alba	6-11 per cent.	25 c.c.
Krameria	20 "	160 "
Geranium	12-27 "	180 "
Catechu	35 "	200 "
Kino	50 "	300 "
Galls (Aleppo)	50-60 "	400 "

(B) Working on a similar basis, it is possible to get relatively approximate values with those drugs that contain oxymethylan-thraquinone or some of its derivatives. In this case .100 gramme of the drug is boiled for a few minutes with a solution containing 5 c.c. KOH $\frac{N}{3}$ + 15 c.c. water. The amount of water that is required to be added to produce a light straw color is noted. In the following table is given a list of substances, the number of cubic centimetres of water required to be added to them to produce colors of nearly equal intensity, and the dose of the drug in grammes :

DRUG.	Number of C.c. of Water Required to Produce a Light Straw-colored Solution with 100 Gramme of Drug + 20 C.c. of KOH Solution.	Dose in Grammes.
Senna (Alexandria) . .	35 c.c.	4-8 grammes.
Senna (Tinnivelly) . .	35 c.c.	4-8 "
Rheum	95 c.c.	0'6-2 "
Frangula	115 c.c.	1-2 "
Rhamnus Purshiana . .	115 c.c.	0'6-4 "
Aloes	295 c.c.	0'20-0'60 "
Aloin (Merck)	395 c.c.	0'3-1'2 "

The shade of color is not pure yellow, but varies in the different drugs. With the sennas, the color is nearly pure yellow. The solutions of aloin and aloes are somewhat yellowish-green. Those of rheum and cascara sagrada are yellowish-purple. The solutions of frangula are still more purple.

It should be noted that, in comparing the above solutions with a solution of chrysophanic acid, the following proportions give a solution of about the same intensity as the drugs examined. To 0.025 gramme of chrysophanic acid add 10 c.c. $\frac{N}{3}$ KOH solution + 15 c.c. water. To this solution 240 c.c. of water are added, when there results a light straw-colored liquid, resembling that of frangula rather closely.

It ought to be said, in presenting these results, that the idea has not been to carry the comparisons outside of the same class of drugs. It would appear, however, that it is possible to go even further, as we see in the above table that there is a direct ratio between the doses of the drugs and their colorimetric valuation; or we may say that the larger the dose required, the less the proportion of water necessary to produce a solution of equal intensity to other drugs of its class and *vice versa*.

(C) In working with certain other drugs that contain coloring principles, we find that fairly accurate values may be obtained on comparing commercial specimens with material whose value, by reason of experiment or experience, we know something about. If we take,

for instance, .100 gramme of hæmatoxylon (logwood) and macerate it with 500 c.c. of water for a short time, the solution will assume a very slight purplish color. If we add to this solution a few drops of ammonia water, it becomes a cherry-red. Comparing this colored solution with that of other commercial specimens, differences in intensity are observable, which indicate the comparative value of the samples.

(D) In endeavoring to ascertain the value of a sample of crocus, carthamus or calendula, we find that light straw-colored liquids are produced on using 0.100 gramme of any of these drugs and mixing them with certain proportions of water. 0.100 gramme of calendula requires 15 c.c. of water, 0.100 gramme of carthamus requires 100 c.c. of water, and 0.100 gramme of crocus requires 500 c.c. of water to produce solutions of about the same intensity of color. We find, moreover, on taking 0.100 gramme of each of these drugs and mixing it with 10 c.c. of alcohol, that the crocus alone is *immediately* colored, producing a solution the color of which is about equal in intensity to the aqueous solution already described. This is a rather quick method for getting approximate values of the commercial articles. It should be noted, as in the preceding cases (A) and (B), that the yellow color of the aqueous solutions is not of exactly the same shade with all three of the drugs. The yellow color is purest with crocus. In calendula, there is a slight purplish tint, and in carthamus there is a shade of color between calendula and crocus.

(E) The most important field of operation, and one which has the greatest promise in the direction already indicated, is with drugs that contain alkaloids or other active principles with which precipitates or colorimetric reactions may be obtained. Operating with quantities of drug varying from .100 to 1.00 gramme, it is soon apparent that results are obtainable which may have as great a commercial significance as the results obtained by the more laborious and tedious methods usually followed by analysts and assayers. The number of specimens operated upon has not been as numerous as was desired, but probably sufficient work has been done to justify calling attention to the importance of another line of investigation on this most important subject of the valuation of drugs from a commercial standpoint.

It seems to the author that if the principles of chemical assay

were reduced to their utmost simplicity, and that if the difficulties surrounding this subject from an economical standpoint were removed, few pharmacists would be unable to determine the value of their purchases.

It ought to be said, too, that this line of work suggested itself after several years of labor in endeavoring to secure results by micro-chemical methods upon the drugs themselves. This latter procedure I reluctantly give up for practical reasons for the present. There are so many other substances in the drug foreign to the principle or principles, the reactions of which are to be studied; and these, with microscopic conditions of heat, moisture, etc., cause an unsatisfactory condition of affairs, in that we have the appearance and disappearance of things, regarding the interpretation of which we cannot say anything definite as yet.

The object sought with the class of drugs here considered has been to ascertain the least quantity of drug which could be employed in making solutions which, with characteristic reagents, would give reactions that might have a commercial quantitative significance, and give methods which might be readily applied by the pharmacist. Before the matter is finally solved and put upon a satisfactory basis, a great amount of work must be done by different experimenters and observers upon each of the drugs where procedures as given are possible.

The following are the drugs that have been experimented upon:

(a) *Nux Vomica* (assaying 2.25 per cent. of total alkaloids).—0.100 gramme of the powdered drug is mixed with 10 c.c. of a modified Prollius fluid¹ and allowed to stand, with frequent agitation, from four to twenty-four hours. The solution is then filtered into a small separatory funnel and 5 c.c. of a dilute sulphuric acid (0.5 per cent.) added, and after separation of the aqueous solution the latter is diluted with 5 c.c. of water. This solution of 10 c.c. contains 0.00225 gramme of the alkaloids of *nux vomica*. Calculating 20 drops as being equivalent to 1 c.c., we have $20 \times 10 \text{ c.c.} = 200$ drops. Then 200 drops of liquid contain approximately .00225 gramme of alkaloids and 1 drop contains $\frac{1}{200} \times .00225 = .0001125$ gramme.

¹ Ether, 60 c.c.; alcohol, 7.5 c.c.; chloroform, 30 c.c.; ammonia, 2.5 c.c. It should be borne in mind in this connection that probably the modified Prollius solution does not extract all the alkaloids in the various drugs equally well.

Two or three drops of this solution on a watch-crystal give with:

- (1) Mayer's reagent, a pronounced white precipitate.
- (2) $K_2Mn_2O_8 + H_2SO_4$, a purple color that is evanescent.
- (3) $K_2Cr_2O_7 + H_2SO_4$, a purple color that is more persistent.
- (4) Gold chloride solution gives a very slight yellow precipitate.

(b) *Guarana*.—1.000 gramme of the finely powdered guarana is mixed with 10 c.c. of a modified Prollius solution and allowed to macerate from four to twenty-four hours. The solution is then filtered into a small separatory funnel and 5 c.c. of a dilute sulphuric acid (0.5 per cent.) solution are added. The aqueous solution is separated and a few drops of this latter solution containing the alkaloids give, with a tannin solution, a white precipitate which readily dissolves in excess of the reagent. A few drops of the solution, after neutralizing with ammonia, are evaporated nearly to dryness in a watch-crystal on a water-bath. A drop of HCl and a very small crystal (or better, a drop of a weak solution) of $KClO_3$ are added to this residue; this is again evaporated to dryness, and on exposing the dried and cooled residue to the fumes of NH_4OH , a faint opalescent blue color is produced. If, instead of employing HCl and $KClO_3$, as in the previous test, a few drops of bromine are added, the solution evaporated to dryness and the residue exposed to fumes of NH_4OH , a more pronounced bluish opalescent color is produced.

(c) *Ipecac* (containing 2.00 per cent. of alkaloids).—One gramme of the powder is mixed with 10 c.c. of a modified Prollius solution and allowed to macerate, with frequent shaking of the bottle containing the mixture, from four to twenty-four hours. The solution is then filtered into a small separatory funnel and 5 c.c. of a dilute sulphuric acid solution (0.5 per cent.) are added. The latter solution containing the alkaloids is separated and 5 c.c. of water are added.

This solution (= 200 minims) contains approximately 0.02 gramme of alkaloids. One minim contains 0.0001 gramme of alkaloids. To a few drops of this solution the following reagents are added and the precipitates noticed:

- (1) Mayer's reagent gives a copious yellowish-white precipitate.
- (2) $K_2Cr_2O_7$ solution gives a copious pumpkin-yellow precipitate.
- (3) Picric acid produces a bright yellow precipitate.

(d) *Gelsemium* (containing 0.35 per cent. of alkaloids).—1 000 gramme of the finely powdered gelsemium is mixed with 10 c.c. of a modified Prollius fluid and allowed to macerate for from four to twenty-four hours. The solution is filtered and treated with 5 c.c. of a dilute sulphuric acid and 5 c.c. of water, as in previous experiments. A few drops of this separated solution (1 drop = 0.0000175 gramme alkaloids), containing the alkaloids, are treated with the following reagents, causing the reactions noted :

(1) Mayer's reagent produces an immediate yellow precipitate.

(2) Ammonium molybdate produces a blue-colored solution which becomes more marked in a few minutes and the color may last for a number of hours.

(3) Picric acid produces a slight yellowish precipitate.

(4) KI + I solution gives an orange-brown colored precipitate.

(e) *Opium* (containing 15 per cent. of morphine).—0.100 gramme of powdered opium is mixed with about 3 to 5 c.c. of a modified Prollius fluid; filtered and treated with 5 c.c. of a dilute sulphuric acid solution, as in the other drugs mentioned. The solution is nearly neutralized with 5 c.c. ammonia water (dil.). A few drops of this solution (1 drop = 0.000075 gramme of morphine) give with (1) KI + I solution, a brownish-orange-colored precipitate, and with (2) Mayer's reagent, a yellow precipitate. (3) If a few drops of the solution are evaporated to dryness on a water-bath, and then a drop of HNO_3 added, a deep brownish-red color is produced.

(f) *Belladonnæ Folia* (containing 0.40 per cent. of alkaloids).—One gramme of the powdered belladonna leaves is digested with 10 c.c. of a modified Prollius fluid, as in the other drugs already mentioned; the solution filtered and mixed with 5 c.c. of a dilute sulphuric acid solution and 5 c.c. of H_2O . The latter solution (1 drop = 0.000020 gramme of alkaloids) containing the alkaloids is separated and a few drops are mixed on a watch-crystal with the following reagents, which give characteristic alkaloidal precipitates: (1) Mayer's reagent produces a pronounced whitish precipitate; (2) tannin solution gives a slight yellowish precipitate; (3) KI + I solution gives at first an orange-brown precipitate, which soon changes to a greenish color.

(g) *Strophanthus*.—One gramme of ground strophanthus is mixed with 10 c.c. of a modified Prollius fluid, and after maceration from four to twenty-four hours with frequent agitation, filtered into a

separating funnel. To the filtered liquid 5 c.c. of a dilute H_2SO_4 (0.5 per cent.) solution are added. The aqueous solution containing the alkaloids is separated. If this solution does not clear rapidly another portion of ether, after its separation, may be added, when the remaining oil is removed. (1) A drop of this solution is placed on a watch-crystal with a drop of dilute ammonia water and then evaporated on a water-bath, giving a residue which is colored green immediately with H_2SO_4 . The green color is soon replaced by a brown coloration. Using two drops of the alkaloidal solution instead of one, a more marked and permanent green coloration is produced with H_2SO_4 (2) Mayer's reagent produces a slight white precipitate with a drop of the solution containing the alkaloid. (3) Tannin solution also gives readily a slight yellow precipitate. (4) $\text{I} + \text{KI}$ solution produces an orange-brown precipitate.

(h) *Cinchona Flava* (containing 7 per cent. of total alkaloids, of which 3 per cent. is quinine).—One gramme of the powder is macerated over night with 10 c.c. of a modified Prollius solution. The solution is filtered into a small separating funnel and 5 c.c. of a dilute H_2SO_4 (0.5 per cent.) solution are added. After agitation and allowing to stand until the two liquids separate, the aqueous solution containing the alkaloids is separated. This solution, which is slightly fluorescent, is rendered neutral with dilute ammonia water, and one drop contains about 0.00015 gramme of quinine. (1) One drop of this solution is mixed with nine drops of water, and upon the addition of a drop of bromine water, followed by an excess of NH_4OH the thalleioquin reaction readily takes place. (2) If one drop of the neutral solution be mixed with four drops of water and a drop of bromine water, followed by a drop of a solution of ferrocyanide of potassium, and then an excess of NH_4OH , a red coloration is immediately produced, which disappears shortly.

II. PHYSICAL TESTS.

There are certain physical tests which are no doubt of considerable value and which may be readily applied with very little cost.

(A) In examining the galls (Aleppo) upon the market one finds a varying number from which the insect has emerged and others in which the grub or winged insect varies in the degree of development. In all of the cases where we have galls with a more or less empty central chamber, we find that they are rather light and not so

rich in tannin as those not so affected. A rather careful examination of the better grades of commercial specimens of galls discloses the fact that in from 5 to 7 per cent. of the galls the insect has emerged as indicated by the perforation. Upon opening the remaining 93 to 95 per cent. of galls, it is found that not more than from 10 to 12 per cent. are hollow and contain the large grubs or young winged insects. The remainder should be nearly solid throughout, and the appearance should be more or less grayish and crystalline, or at the most light yellowish and resinous in appearance. Galls answering to these characters will assay 50-60 per cent. of tannin.

(B) The specific gravity of at least some drugs has seemed to the author deserving of consideration in ascertaining their commercial value. Last year I was fortunate in setting a student of the Philadelphia College of Pharmacy, Alfred Heineberg, at work in determining the amount of resin in both resinous and starchy tubers of jalap, and also in determining, among other things, the difference in specific gravity of the two kinds of tubers. The results of this work showed that the starchy tubers contained but 1.76 per cent. of resin and had an average specific gravity of 1.194. The resinous tubers of jalap assayed 6.62 per cent. of resin and showed a specific gravity of 1.360, and thus it was demonstrated that, in addition to the appearance of tubers of jalap, a quick method for determining the value of them lies in taking their specific gravity.¹

This was subsequently found not to be a new idea in getting at the valuation of tubers of jalap. H. Hager ("Proc. A. Ph. A.," 1893, p. 120) prepares a solution of common salt (having a specific gravity of 1.140 to 1.142) by dissolving 200 grammes of table salt in 1,055 grammes of water. The mixture is brought to a temperature of about 15°-17° C., and about fifty tubers are then immersed in this liquid. Not less than forty-five out of fifty tubers should sink in the liquid, and all that do not sink should be rejected, since good tubers have a specific gravity between 1.150 and 1.180. After examination, the tubers are put into a sieve, washed off with water and dried with a linen cloth. Dr. Hager furthermore thinks that the specific gravity of the salt solution might be increased to 1.150. It is rather interesting that the results of experiments carried on by Mr. Heineberg and those of Dr. Hager should so closely agree.

¹ The tubers should be broken in pieces before taking their specific gravity.

The method of Hager is a simple one and deserving of attention from a practical standpoint, as chemical assays of a lot of jalap tubers represent the values of but a few tubers, unless the whole lot is in a ground or powdered condition.

(C) The author has been desirous of applying this method of examination to rhubarb and inula, taraxacum and a number of other inulin-containing drugs, but want of time has prevented this work being done.

(D) *Absorbent Cotton*.—"In addition to the ordinary test applied to determine the value of absorbent cotton, it has been proposed (*Schweiz. Woch. Pharm.*, 1899, 20) to test its elasticity by observing the weight required to compress a given weight of cotton into a definite space. A comparison has proven that the lower grades of absorbent cotton made from the sweepings, etc., have much less resiliency than has that of good quality made from the high-grade American cotton."

Equally important, however, is the measure of the length of fibres and the determination of the amount of oil adhering to them. For the latter test the cotton fibres are mounted in a saturated chloral solution, when the oil globules adhering to the fibres are manifested in the mount.

(E) The gelatinization test given by the U.S.P. under chondrus is worthy also of an extended application to all drugs containing gums or mucilages. The writer finds that the purity of powdered acacia may be readily ascertained on mixing 0.500 gramme of the powder with about 17 minims of water at about 30° C., when, if the acacia is pure, there will be produced shortly a clear mucilaginous mass. With dextrins, or a gum arabic containing dextrin, the resulting mass is either cloudy or less cohesive, or both.

III. MICROSCOPICAL METHODS.

The microscope may oftentimes be utilized when other methods of valuation fail. The microscope is an important adjunct in determining the percentage value of certain foods and drugs, as in the cereals, spices, etc., when starchy materials are used to adulterate them. It does not appear necessary to dwell upon this work here, the author deeming it sufficient to refer to his previous communications on this subject as published in the "Proceedings of the A. Ph. A.," and in the AMERICAN JOURNAL OF PHARMACY, and

also to a recent paper on "The Examination of Commercial Flour," in the *Four. Amer. Chem. Soc.*, August, 1899.

It ought to be mentioned, however, that this is a subject which, as shown by recent communications in this country as well as abroad, is receiving more and more attention (see *Pharm. Review*, Feb., 1899). Microscopical methods for the quantitative valuation of drugs may be divided into those (1) where no reagents are employed and (2) in which micro-chemical reactions are necessary.

Under Class I may be mentioned: (a) the determination of a foreign starchy adulterant in a drug; (b) the number of secretion cells, hairs or reservoirs containing oils, resins and other principles, as in rhizomes and leaves, etc., containing these products; (c) in determining the number of sclerenchymatic cells or fibres or other characteristic cells of an adulterant or admixture in a drug or food. This is particularly applicable in the study of the spices, some foods, as tea, coffee, cocoa, as well as in drugs.

No doubt upon further examination a very important relationship will be shown to exist between certain cell-contents and the active principles in drugs. It appears, from the further investigations by Mr. Heineberg, that there is a ratio in jalap between the percentage of resin and the number of starch grains and crystals of calcium oxalate. The following table gives the average number of crystals and starch grains found in a mount of 1 milligramme of powdered jalap. The per cent. of resin and specific gravity of the tubers in each lot had also been determined.

SAMPLE.	Per Cent. of Resin.	Specific Gravity.	Crystals of Calcium Oxalate in 1 Milligramme.	Starch Grains in 1 Milligramme.
1	1'76	1'194	88	357
2	6'62	1'360	125	140
3	7'64	1'297	107	178

From these results it would appear that the microscopical method for determining the value of jalap would be as valuable as the method of specific gravity.

Probably the most important class of substances that require a microscopical examination in order to determine their value are the "compound powders," as pulvis glycyrrhizæ compositus,

pulv. sarsaparillæ comp., and others for making fluid extracts and other pharmacopœial preparations. I recently met with a rather interesting case, which is worthy of mentioning here. In examining some compound licorice powder, which had been in a container on a shelf for about nine months, I found that there was an uneven distribution of the different substances that entered into it. I have reason to believe that they were originally well mixed, but that, upon standing in a building in a large city where traffic of teams, etc., in the streets was continuous, causing vibrations or jarring, there was a fractional precipitation of the different substances entering into the powder, those which were heavier or smaller in size manifesting a tendency to form a lower strata, and those tissues that were more fibrous and lighter remaining nearer the surface. This serves to indicate the importance of examining the compound powders that may be purchased and also of shaking up the powders in the containers before using them.

(2) The use of the microscope, where micro-chemical reactions are to be employed, will, no doubt, be somewhat limited in the immediate future, owing to certain difficulties in technique in the work. There are a number of drugs, however, in which important data may be obtained by this means, as *nux vomica*, *strophanthus*, *hydrastis*, *spigelia*, *crocus*, etc.

(a) When *nux vomica* is sectioned and treated with a sulphuric acid solution containing K_2CrO_7 or cerium hydroxide, a rose-colored reaction appears in the endosperm cells which contain the strychnine. The reaction is rather a slow one, owing to the thickness of the cell walls of the endosperm.

(b) *Strophanthus Seeds*.—Sections of the seed are put into concentrated H_2SO_4 (C. P.). Those containing strophanthin give a green color, apparently in the endosperm layer. It must be said, however, that in seeds in which some of the sugar compounds are present, there results, with the albuminoids and nitrogen-containing compounds and the H_2SO_4 , a rose or red or reddish-brown color. These color reactions sometimes obscure the green of the strophanthin.

(c) *Hydrastis*.—Sections of the rhizome, when put into concentrated H_2SO_4 (C. P.), give in the course of a few minutes a number of needle-shaped crystals of the alkaloids. These increase in number and size as the walls dissolve, and in the course of half an hour the mount is filled with yellow microscopic crystals.

(d) *Spigelia* may be readily distinguished from *Phlox carolina* by the fact that the numerous cells in the cortex of the latter contain crystals of calcium carbonate. The proportion of phlox in the *spigelia* may be determined by testing a sampling of the drug which contains say about ten pieces of rhizome. If two of these give the micro-chemical reactions for calcium carbonate, then the amount of adulterant may be set down as being probably 20 to 25 per cent.

(e) *Crocus*.—In determining the value of a sample of crocus, one of the quickest ways is to sample the drug and take from 10 to 100 pieces and put them one by one on a slide containing concentrated H_2SO_4 (C. P.). The number which are colored blue in proportion to the others which are not colored blue represents the percentage of stigmas of crocus in the drug.

The following are the results of an examination of this kind made by Mr. William S. Weakley, a recent graduate of the Philadelphia College of Pharmacy, upon nine samples of commercial saffron :

SAMPLES.	Number of Fragments Colored Blue by H_2SO_4 .	Number Not Colored Blue with H_2SO_4 .
1	90	10
2	68	32
3	86	14
4	78	22
5	82	18
6	—	26
7	88	12
8	48	52
9	46	54

(f) The study of micro-chemical reactions for alkaloids other than those already enumerated is attended with so much uncertainty that it cannot be said that they can be employed with any degree of satisfaction in the determination of quantitative values. I deem it far more expeditious in most cases, as in conium, cinchona, guarana, cloves, illicium, colchici cormis, opium, cocculus, oleum rosæ, amygd-

dala amara, stramonii semen, etc., to exhaust small quantities of the drug with suitable solvents. Then in some cases the active principles are removed from these solutions by shaking out with water. Upon these aqueous solutions tests are then made with various reagents, the precipitates of which may be further examined microscopically. H. Behrens, in his "Anleitung zur Mikrochemischen Analyse," has shown that rather delicate separations may be effected by the different alkaloids in drugs. These separations, however, must be effected upon solutions of the alkaloids of the drugs, rather than upon the drugs themselves. This is a most interesting field for future work, and is one teeming with great possibilities. One of the recent papers on this subject is that by Zenetti (*Pharm. Zeit.*, XLII, p. 752), in which he has endeavored to differentiate the alkaloids by reason of the differences in crystal-line structure of the precipitates obtained, these being examined by means of a microscope. His results are summed up as follows: *Strychnine* yields feathery crystals twisted into a sickle shape, sometimes into corkscrew-like combinations. *Brucine*, after two or more days, shows numerously branched formations, with small, shingled rods inserted at right angles on each branch. *Atropine* yields, after a day, numerously branched structures, the tips of the branches consisting of right-angled, thin, smooth plates, with smaller similar plates adherent. *Cocaine* gives rise in a day to the formation of glittering, golden tufts, consisting of acutely pointed needles. *Nicotine* yields a precipitate which almost invariably takes the form of small, sparsely branched rosettes, composed of rigid, unbranched arms, which frequently terminate in a point or long bristle.

(To be continued.)

MAGNESIUM CITRATE, EFFERVESCENT, ADULTERATED WITH MAGNESIUM SULPHATE.

BY LYMAN F. KEBLER.

Recently the writer was given a sample of magnesium citrate, effervescent, with the information that the article was offered so cheaply that its purity must certainly be called into question. Physically, the article was good. A cursory examination indicated a large excess of sulphate, which, on estimation, amounted to 24.67 per cent., calculated as magnesium sulphate.

The presence of tartaric acid was also suspected, and, on submitting the article to the test outlined by the U.S.P. for detecting this acid, its presence was indicated. But a microscopical examination of the small crystals, which were supposed to be potassium acid tartrate, showed that the crystalline structure did not correspond to that of potassium bitartrate. Further examination proved the precipitate to be potassium sulphate. Potassium sulphate being moderately insoluble in water, the addition of potassium acetate to a saturated solution of the effervescing salt, containing an abundance of sulphate, naturally favored the production of the above chemical. The pharmacopœial test for tartaric acid cannot, therefore, be applied to effervescing magnesium citrate containing much sulphate.

RECENT LITERATURE RELATING TO PHARMACY.

A STUDY OF ALOIN.

The work of Tschirch and Pederson, in tracing the analogy of aloin to the oxy-methyl-anthraquinones, received confirmation in an investigation reported by O. A. Oesterle (*Arch. der Pharm.*, 1899, 81). He mixed an alcoholic solution of aloin (which had been freed from emodin by ether extraction) with concentrated aqueous hydrochloric acid and heated mixture from eighteen to twenty-four hours on a water-bath in a flask with return condenser. After standing some weeks, a crystalline substance, giving that cherry coloration so characteristic of the natural oxymethyl anthraquinones, separated from this mixture.

The crude product, purified by sublimation, or, better, by crystallization from toluol, after decolorizing with animal charcoal, melted at 232° – 233° C., and corresponded on analysis to the formula $C_{15}H_{10}O_5$.

An acetyl derivative was prepared by boiling an hour with acetic anhydride and sodium acetate, and analysis of the purified product, which melted at 177° – 178° C., indicated a di-acetyl body of formula $C_{15}H_8(C_2H_3O)_2O_5$. The three emodins from frangula, rhubarb and aloes, respectively, show the formula $C_{15}H_{10}O_5$, and of these, aloë-emodin melts most nearly the new product. To confirm identity, the writer prepared the acetyl derivative of aloë-emodin, and found it the same as that obtained above, hence he decides that hy-

drochloric acid converts aloin into aloë-emodin and not into rottlerin as Rochleder thought.

Hydrolysis of aloin was next tried, but no sugar resulted, thus contradicting Kosman's statement that aloin was a glucoside.

The oxidation products of aloin were next studied, and results obtained were not in accordance with Tilden's investigations. The latter obtained, on oxidation with chromic acid mixture, a body melting at 260° – 265° C., which he called aloxanthin, and which he supposed was tetraoxymethyl anthraquinone, $C_{15}H_{10}O_6$. Oesterle, by same method, obtained a product melting at 223° – 224° C., the analysis of which approximated $C_{15}H_8O_5$. This body he called alochrysin.

H. V. A.

ETHER INHALATION.

Rushmore (*Annals of Surgery*, October, 1898) has found that the dangers and disagreeable symptoms resulting from ether-inhalation may be materially diminished, if not altogether abolished, by careful preparation of the patient and careful administration of the anesthetic. Six minims of Magendie's solution, with atropine sulphate, gr. $\frac{1}{120}$, are injected hypodermically, as a routine procedure from half an hour to an hour before the anesthetization. The advantages of this treatment are pronounced. The morphine quiets the nervous system, renders the patient more susceptible to the ether, less of which will thus be required, and insures a more quiet recovery from the anesthetic; furthermore, it lessens the disposition to nausea and forestalls pain that the patient might otherwise suffer. The atropine limits the amount of secretion from the bronchi, larynx and pharynx, stimulates the heart, prevents undue leakage from the skin and thereby lessens or prevents shock. With regard to the method of administration, the so-called open method is much to be preferred. If the ether is administered drop by drop, not more than 7 minutes, on an average, are required to induce complete anesthesia, and but 3 or 4 ounces will be necessary for the entire operation. With this mode of administration ether may be safely used in pulmonary, cardiac or renal diseases, without undue risk. Less than 10 per cent. of cases personally so treated by Rushmore were troubled with nausea, and these only to a slight degree.—*Phila. Med. Jour.*, 1898, p. 1059.

J. L. D. M.

NEUTRAL SODIUM PHOSPHATE.

Having frequently received orders for pure neutral sodium phosphate, Mr. Brunner decided to prepare such an article, if possible. The purest article available was dissolved in water and phosphoric acid added until a decided acid reaction to litmus was obtained. On concentrating and crystallizing from this acid solution, the crystals gave a red coloration with phenolphthalein. From this it would seem that the preparation of a neutral sodium phosphate is apparently impractical. 1898, *Ztschr. anal. Chem.*, 37, 740.

L. F. K.

SOLANINE IN POTATOES.

Sound potatoes of the crops of 1897 and 1898 were boiled, peeled and the solanine extracted by the method of G. Meyer (*Arch. f. Path. und Pharm.*, 119, 361), and there was obtained, respectively, 0.02 and 0.026 of a gramme per kilogramme. Selenium-sulphuric acid gave a fine red coloration on warming, and phosphomolybdate produced a yellow precipitate. A very reliable reaction for solanine is a solution of telluric acid in dilute sulphuric acid. This gives an intense raspberry-red coloration when warmed on the water-bath. This color lasts from two to three hours, and is not given by the more common alkaloids, such as atropine, morphine, quinine, etc.—Dr. Bauer, 1899, *Ztschr. f. angewand. Chem.*, No. 5, 99.

L. F. K.

DIGESTIVE FERMENTS OR ENZYMES.

Dr. H. Leffmann, in the *Four. of Franklin Inst.*, 147, 97 (1899), reports some very interesting results on the interfering reaction of certain food preservatives, especially on starch digestion. The experiments were conducted under uniform conditions, as far as was possible by laboratory methods. A 10 per cent. arrow-root starch solution was made fresh daily and employed in all investigations.

The enzymes employed were malt diastase, taka-diastase, pancreatic extract, peptenzym, a preparation containing all of the enzymes of the alimentary tract and carase, the pawpaw enzyme, sold under the trade name "Caroid." Pepsin and the pineapple ferment were also experimented with, but the results were not considered worth reporting.

The antiseptics used were saccharine, β -naphthol, formalin, artifi-

cial and natural benzoic acids, artificial sodium benzoate, boroglyceride, salicylic acid, boric, citric and tartaric acids, sodium carbonate, borax, sodium fluorid, sodium silicofluorid and a mixture of borax and boric acid. From his observations, the author is of the opinion that if the use of any preservatives is to be permitted in food, sodium benzoate and boric acid are the least objectionable, since they appear to have the least tendency to disturb the digestive functions.

L. F. K.

EDITORIAL.

THE PRODUCTION AND CULTIVATION OF CAMPHOR.

In 1890 Prof. John M. Maisch called attention to the attempts on the cultivation of the camphor tree in Florida and exhibited specimens at one of the Pharmaceutical Meetings of the Philadelphia College of Pharmacy of the crude camphor obtained from trees grown there (this JOURNAL, 1890, p. 565, 592). A few years ago Lyster H. Dewey prepared a paper on the camphor tree (this JOURNAL, 1897, p. 507), and showed that experiments were being conducted in this country to cultivate the camphor tree, and that it had been grown successfully out of doors as far north as Charleston and Summerville, S. C.; Augusta, Ga., and Oakland, Cal. The article is a valuable one, and while he does not enter into the difficulties connected with the subject (*i. e.*, in getting cheap enough labor, etc.), yet indicates the possibilities of an important industry of this kind by reason of the fact that, while in recent years the importations of camphor are decreasing, the price is steadily increasing.

In an article on "The Production of Camphor in China," Augustine Henry (*Pharm. Jour.*, 1897, March 6; *AMER. JOUR. PHARM.*, 1897, p. 259) said that, while the production of camphor on the mainland of China was an affair of only the last few years, at Kwangsi it promises to develop into an important industry.

There are a number of people, particularly in the Old World, who are considering the possibilities of producing camphor from cultivated plants, and it may interest the readers of this JOURNAL to know the present outlook on the production and cultivation of camphor. We give an excerpt on this subject from the *Kew Bulletin*, 1899, p. 65:

"PRODUCTION IN FORMOSA.

"The following is extracted from the Foreign Office Report on Trade in Japan for 1897 (Misc. Series, 440, pp. 71-72) :

"The trade in camphor will probably undergo some modification. Camphor trees are not found in that part of the island (of Formosa) occupied by Chinese settlers. They occur only in the country of the aborigines, or upon the immediate border, and up to the present time the destruction of trees has been carried on in the most wasteful manner. The mode of obtaining supplies of camphor was for foreign merchants, through Chinese agents, to advance money to the savage chiefs for permission to cut down trees. The stills were erected at the expense of the foreigners, who paid a tax of \$8 a still to the Chinese

authorities, and a local tax of \$10 on each picul (133 pounds) of camphor produced. When the island was ceded to the Japanese, the privileges which foreigners had enjoyed under Chinese rule, of having these camphor establishments in the interior, seemed likely to be withdrawn by the Japanese Government. The Chinese treaty, much more than the Japanese, gives freedom of travel and trade to the foreigner; and if the limitations imposed by our treaty with Japan had been strictly enforced in Formosa, foreigners would have had to retire to the treaty ports. They would have been debarred from distilling or purchasing camphor in the interior, and they would have suffered heavy losses in abandoning the capital already sunk there. Considering that the present treaty had only two more years to run, the Japanese Government has consented to let matters remain *in statu quo*; and when under the new treaty, foreigners obtain a right to settle anywhere in the interior, they will be able to distil as much as they like. But there is also a probability that the preparation of camphor will be made a Government monopoly. With the Formosan supply under its control the Japanese Government could almost secure a monopoly of the camphor trade, for Japan and Formosa are almost the only sources of supply; and advantage may be taken of this to put Formosa's finances on a satisfactory basis. The lands where the camphor trees grow are not privately owned, as is the best portion of Formosa's fertile plains, so the Government could appropriate the camphor-producing districts without interfering with vested interests.

"The following further information is given in the Report on the Trade of Tainan for 1897 (Foreign Office Annual, 2149, pp. 5-6):

"The camphor trade has, so far as concerns foreign merchants in South Formosa, almost entirely stopped, owing, among other causes, to the disturbed state of the country and the difficulty and danger of sending money into the camphor districts. The roads continued throughout the year to be infested with armed robbers, who, on the approach of the military or police, fled to the hills (where it was, apparently, impossible to pursue them), only to reappear at the first favorable opportunity. Robberies became of such frequent occurrence that no foreign or native merchant would venture to send money into the interior. The Japanese authorities, on their part, did not see their way to allow the tax to be paid in the treaty port on arrival of the camphor, and business was consequently brought to a standstill.

"In the raids and skirmishes, too, which have taken place in the camphor-producing districts, numbers of stills have been destroyed. Their destruction was, perhaps, inevitable, but as they were almost entirely erected with money advanced or loaned by foreign merchants in South Formosa, the losses incurred by the latter have been very considerable. It is estimated that not one-third of the stills in existence two years ago, in which foreigners in South Formosa are interested, are now available for camphor production.

"The hope expressed by Her Majesty's Consul in last year's report, that the camphor trade might revive and assume large proportions, has not been realized; in fact, far from this being the case, the camphor export business, as far as South Formosa is concerned, has now (April, 1898) almost stopped.

"These remarks, of course, apply exclusively to the export of camphor by foreign merchants in this district (South Formosa) who have in the past invested considerable sums of money in the business. The production of cam-

phor in the districts of Rinkipo and Shu Shu (Hunliu and Chip Chip), the principal districts whence the drug came to South Formosa, still, I am informed, continues, though to nothing like the same extent as formerly; but all the camphor so produced finds its way via the port of Rokko (Lokkang) to Tamsui, whence it is shipped to Hong Kong and Japan. The roads north of Rokko are said to be perfectly safe, so that dealers can reach the neighborhood of Chip Chip and buy up any camphor that, under other circumstances, should and would go to the foreign firms in Tainan, with whose money the business was first started. Things may remedy themselves in course of time, but the outlook at present is certainly not very bright.

"The following table shows the export of camphor from this port since, practically, the commencement of the trade:

YEARS.	Number of Boxes Exported.
1892	4,315
1893	6,691
1894	12,157
1895	10,145
1896	8,001
1897	3,057

NOTE.—One box contains about 1 picul (133½ pounds) of camphor.

" PRODUCTION IN CEYLON.

"The cultivation of the camphor tree has attracted some attention in Ceylon. But, as will be seen from the following correspondence which has appeared in the *Ceylon Observer*, both it and the production of the drug are in the experimental stage.

"SUPERINTENDENT, HAKGALA BOTANIC GARDENS, TO EDITOR
'CEYLON OBSERVER.'

"BOTANIC GARDENS, HAKGALA, April 6, 1898.

"DEAR SIR:—Referring to your question as to what is being done with camphor cultivation in Ceylon, I may add the following to what I wrote you on the 11th of February last. Wishing to satisfy myself that solid camphor exists in the leaves and twigs of even very young plants, I sent a small bundle of prunings, from plants planted out at the end of 1895, to Mr. S. A. Owen, of Messrs. W. Jordan & Co., of Lindula, who had very kindly undertaken to make the experiment for me. I am pleased to state that he has been very successful in extracting solid camphor from them; and as this is of general interest to planters, I shall be much obliged if you will be good enough to publish Mr. Owen's letter in an early issue of your paper.

"The prunings from an average plant 28 months old, as grown here, weigh from 10 to 12 pounds.

"I have a good many plants that want pruning, and if applied to before the end of this month, April, I shall be very glad to supply 10 or 20 or 35 pounds prunings to any person wishing to make the experiment for himself.

"I am, etc.,

"W. NOCK.

"MR. S. A. OWEN TO SUPERINTENDENT, HAKGALA BOTANIC GARDENS.

"TALAWAKELE, March 30, 1898.

"DEAR MR. NOCK:—Thanks for the parcel of camphor prunings duly received. I have made several experiments. The following is the account of method employed and results:

* * * * *

"A gallon iron kettle was packed with $1\frac{1}{2}$ pounds of leaves and small twigs, together with about 2 pints of water. The cover of the kettle was luted on and the spout fitted with a cork, while a long glass tube proceeded from the cork to a condenser. Applied heat gradually, and kept it up for five hours. At the end of this time the sides of the condenser were coated with camphor, and small lumps were floating in the water which distilled over. All the camphor was collected carefully and dried between bibulous paper (to absorb most of the adhering oil). It then weighed 55 grains, which is equivalent to 12 ounces to the hundredweight, or 15 pounds to the ton.

"I think the results very encouraging, as the leaves and young parts of the camphor tree contain but a very small proportion of camphor compared with the trunk-wood. Indeed, I believe that in Formosa and other camphor-producing countries it is customary to altogether discard the branches and leaves and use the main-wood only.

"I should think that planters who have young camphor trees coming on here in Ceylon would find it well worth their while to utilize their prunings—especially if fire-wood is available and cheap, as this latter item would be practically the only expense, beyond the small amount of labor required and the initial expense of a still, which latter could be easily extemporized out of almost any kind of large iron vessel to which heat could be applied. As the camphor tree is a long while coming to maturity, considerations of this kind ought to be borne in mind.

"I have pleasure in enclosing a small sample of the camphor obtained. As you will see, it has a rather dirty appearance, due to unavoidable impurity, and the sample smells of camphor oil, but these are easily got rid of in the process of refinement. I also enclose a small sample of the same camphor partly purified by sublimation.

"You are, of course, very welcome to make what use you like of this account of these small experiments, whether by publication or otherwise. No doubt it would be encouraging to those who have gone to the expense of planting up camphor trees to know that there is camphor in our locally-grown trees. I have heard of one or two misgivings as to whether the soil and climate here would favor the formation of camphor in the tree.

"Yours faithfully,

[Signed]

"S. A. OWEN."

REVIEWS AND BIBLIOGRAPHICAL NOTICES.

THE DISPENSATORY OF THE UNITED STATES OF AMERICA. By Dr. George B. Wood and Dr. Franklin Bache. Eighteenth Edition. Thoroughly revised and largely rewritten. With illustrations. By H. C. Wood, M.D., LL.D.; Joseph P. Remington, Ph.M., F.C.S., and Samuel P. Sadtler, Ph.D., F.C.S. Philadelphia: J. B. Lippincott Company. August, 1899.

This work, so well known and so much appreciated by the medical and pharmaceutical professions for nearly three-quarters of a century, has now been revised for the seventeenth time. While we recognize the remarkable advances in the sciences since 1833, when the first edition of the United States Dispensatory was first published, it must be further apparent that there have been equally as rapid advances during the past few years. The editors of this Dispensatory truly say that, since the publication of the seventeenth edition, "at no period has there been so much activity in the field of *Materia Medica* and *Therapeutics* as during these five years." Recognizing the numerous additions to our knowledge, they have, in about a year after the edition of the new British Pharmacopœia, produced a work which, with its comments upon this standard, as well as the revision of old matter and introduction of new material, is very welcome to the professions requiring this book for daily use. "The most laborious work of the editors has been in the consideration of synthetic remedies, and excepting in regard to the British Pharmacopœia, the greatest amount of change will be found in Section II, Part II, of the present volume, which treats of new drugs, nearly 200 articles having been written for this portion of the book."

That an attempt has been made to bring the work up to recent date is shown in almost all the articles considered. For instance, under assay processes of the potent drugs the recent improvements are given, together with copious references to literature. We find, further, that in the preparation and testing of the various pharmaceutical preparations the more recent experiments and criticisms are incorporated. That portion of the work treating of the various constituents of plants has been well brought up to date. The portion on the newer synthetic remedies and drugs is of particular interest to the professions, as it represents the latest and most authoritative information on those drugs which are likely to have a more or less permanent place in the *materia medica*. The nomenclature of the botanical portion of the book has been gone over and brought in accord with the views of modern systematists. Many new facts regarding the toxicology, medical properties and uses of drugs and their preparations are given.

Taking the work as a whole, it can be safely said that the work of revision and rewriting has been credibly done, and that the members of the professions of medicine and pharmacy will find in the present edition a work which continues to be invaluable as a "time saver" in getting at the most recent information on all subjects pertaining to the origin, habitat, physical, chemical and medical properties, pharmacy, adulteration, uses, toxicology and modes of administration of all the drugs and preparations which are employed at the present day.

A LABORATORY MANUAL OF PHYSIOLOGICAL CHEMISTRY. By Elbert W. Rockwood, B.S., M.D., Professor of Chemistry and Toxicology in the University of Iowa. Illustrated with one colored plate and three plates of microscopic preparations. $5\frac{3}{8} \times 7\frac{3}{4}$ inches. Pages viii-204. Extra cloth, \$1, net. Philadelphia: The F. A. Davis Company.

The author being firmly convinced of the superiority of the laboratory method of instruction over the didactic, in enabling the student to become familiar with the physiological changes in progress in the animal body and

the products resulting therefrom, has written this work, giving experiments and directions for carrying on work in physiological chemistry. The following subjects are treated: carbohydrates, fats, proteins, fermentation, saliva, gastric juice, pancreatic juice, blood, bile, bone, muscular tissue, milk, urine, urinary sediments, systematic testing of urine, urinary calculi, the metric system, and composition of reagents.

The work has been arranged for a course of one year in a medical school, but a careful perusal of the work indicates that there is much information here for pharmacists. Many of the experiments—in fact, all of them—if properly carried out, would enable the pharmacist to carry on much of the work that he has to do for the physician more intelligently and profitably. The parts of the book treating of urine, urinary sediments, systematic testing of the urine, blood and ferments will be found particularly valuable to pharmacists who are alive to the professional possibilities and opportunities of their calling.

ANNUAL REPORT ON THE YEAR 1898. Darmstadt: E. Merck. Published in March, 1899.

In addition to the report on the subjects in medical chemistry, microscopical technique and the nutrition of patients, which have gained importance during the year 1898, this little work contains a valuable original communication upon the "Physiological and Therapeutical Investigations on the Action of Some Morphia Derivatives," by J. v. Mening.

By way of comparison with respect to their solubility in water at the ordinary temperature, the commoner salts of morphia and its derivatives are classified as follows: (1) Codeinæ phosphas, 1:4, acid reaction, hence painful when injected; (2) Dionin, 1:7; (3) Codeinæ hydrochloras, 1:20; (4) Morphiæ hydrochloras, 1:24; (5) Codeine alkaloid, 1:78; (6) Peronin, 1:133; (7) Ethyl-morphia, 1:286; (8) Morphia and (9) Heroin, nearly insoluble. Dionin possesses, accordingly, the greatest solubility among the bodies forming the subject of this article.

MINUTES OF THE PHARMACEUTICAL MEETING.

The first of the series of Pharmaceutical Meetings for 1899-1900 was held Tuesday, October 17th, in the museum of the College, with Prof. Joseph P. Remington as chairman. The meeting was well attended, and it is to be hoped that a like interest will be manifested in each of the subsequent meetings of the series. The occasion furnished a special opportunity for Philadelphia pharmacists in that two of the speakers were from a distance.

Dr. Clemens Kleber, chemist for the firm of Fritzsche Brothers, of New York, was first introduced, and read a valuable and interesting paper on "The Analysis of Essential Oils," which will be published in full in a later issue of this JOURNAL.

The author called attention to the fact that, notwithstanding the numerous contributions of many of the most eminent chemists, the chemistry of the essential oils is still far from being concluded, and in this connection he enumerated some of the problems arising at the present time. Details of methods of analysis, together with descriptions of devices which the author had found

practicable in carrying out the various processes of distillation, etc., were then given, with the statement that it is impossible to formulate a fixed scheme whereby all analyses of essential oils can be conducted. An appendix of the paper contained an index of the more important components of essential oils, together with the melting and boiling points of such of their derivatives as are serviceable for their identification.

In answer to a question by Professor Remington, as to the variability in specific gravity of essential oils collected at different times of the year, Dr. Kleber said that there is a difference in this respect, but that, owing to their greater yield at certain seasons, not much attention had been paid to this question.

Prof. John Uri Lloyd, of Cincinnati, whose versatility as a writer and thinker on both scientific and philosophical questions is so well known, was present and made a short address on the early history of medicine in America, with special reference to the origin of eclecticism.

After some rather happy preliminary remarks incident to the occasion, Professor Lloyd proceeded to give the early record of schools of medicine in America, beginning with the year 1798. He said that perhaps the first man to study our native materia medica was a talented old German named Schepf, who came as a Hessian soldier to serve in the army of Cornwallis. He afterwards went through the country collecting medicines, and when he went back to Europe published the results of his labors in the Latin language. The first English work on materia medica in this country was that published by B. S. Barton, of the University of Pennsylvania, in 1798. In 1801 a second edition appeared, and in 1804 a second part to the work was published. Following Barton came a man belonging to the irregular school of medicine—Samuel Thomson. He was stern, dogmatic and irregular in every sense of the word. He was opposed to the colleges and believed in setting aside the old teachings. His great precept was that heat is life and cold is death. His medicines were numbered from 1 to 12, his "No. 6" being the compound tincture of myrrh. He believed in lobelia and capsicum, and a course with Thomson meant sweating, vomiting, etc. That he was earnest and honest may be believed from the fact that he died under his own treatment. He was much persecuted and was put in jail in Massachusetts for giving lobelia to a patient who died subsequent to the treatment. He afterwards made a tour of Ohio and granted patents to practice medicine in accord with his system of medication, providing the party would buy his book and pay the price, which was \$25.

Thus it was that the present patent system originated. Though we may criticise his methods, he was kinder than the regular physicians at that time, who practised bleeding and other similar harsh treatment. Thomson came as a reformer in opposition to them, and suffered much persecution by reason of his aggressiveness.

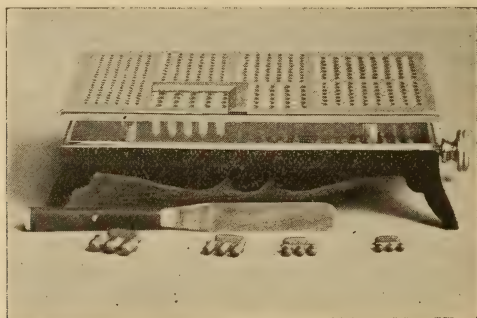
Then came Beach, who proposed even to reform Thomson. His methods were kindlier, and very soon the followers of these two were antagonistic, and they in turn were opposed by the regulars. But the new system developed, and as an outcome an Eclectic School of Medicine was established at Worthington, O., which was the first attempt to teach systematic medicine in central Ohio. Thus it will be seen that there was a difference between Thomsonianism and eclecticism. At this point Professor Lloyd called attention to a very

prevalent but erroneous opinion in regard to eclecticism. He said that it is a mistake to suppose that eclectics will not use minerals. They will use any medicine that will do the work. It is not the use, but the abuse of harsh remedies which they oppose. For example, they found that calomel was being used to an undue extent, and in its stead suggested the use of podophyllum and other more kindly medicines.

In this connection it is of interest to state that the most persistent efforts have been constantly made by eclectics to develop the American materia medica. They have given preference to American productions when possible, and have faithfully and systematically studied our indigenous remedies, giving the result to the world of medicine.

At the present time there are probably 10,000 practising physicians belonging to the eclectic school, and probably 100,000 belonging to the regular school, while Thomsonianism, as such, no longer exists, the name having been changed to physio-medical.

Further commenting on the principles of the eclectic school, Professor Lloyd said that eclectics aimed to be very liberal, but that their cause had suffered on



this very account; that it had been injured by quacks who called themselves eclectics, a quack being, according to his definition, a man who pretends to cure incurable diseases. He said that the code of ethics of eclectics is the golden rule. They claim that any one needing the physician's help should receive it.

Finally the speaker said that the regulars and eclectics are not as friendly as they might be, but kindlier than they have been. He believed that there is room enough for all to work along various lines of research and for humanity. The prominent schools of medicine, the homeopathic, the regular and the eclectic, are growing to recognize the merits of each other and to let the bad go by.

Professor Remington said that he had listened with a great deal of interest to the address, and that he certainly believed, as the speaker said, that as we grow older we become more tolerant, and that all schools are becoming more liberal.

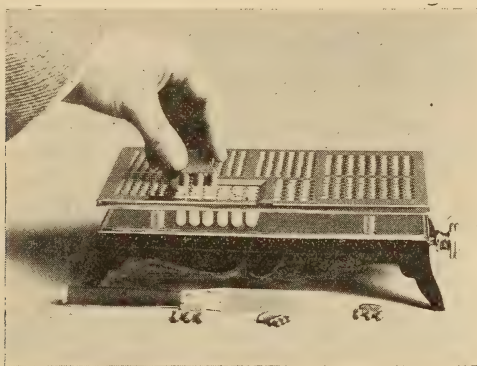
Dr. C. B. Lowe said that Professor Lloyd's remarks took his memory back to a town in New Jersey, and to a small sign, "Thomsonian Drug Store," which was the only one he ever saw.

Frederick T. Gordon, apothecary at League Island Navy Yard, made some

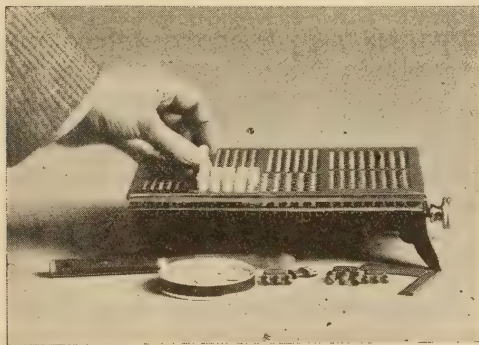
interesting remarks on "The Use of Wood Pulp Sheets as a Substitute for Flaxseed Meal and other Substances in Poultices; also a Few Other Uses for the Material" (see page 525).

Following was an exhibition of specimens, apparatus, etc.

Professor Remington called attention to a new form of capsule filler, the invention of Mr. Ihrig, of the firm of Emanuel & Ihrig, of Pittsburg, Pa. The



apparatus consists essentially of a metal base having a horizontal surface, surmounted by another metallic plate or table having perforations for holding the various-sized capsules, and which may be raised or lowered, as desired, by a screw adjustment. When in position for filling, the lower portion of the capsules should rest on the lower table, and the top part should be slightly below the surface of the upper table. After distribution of the powder with a spatula,



it is pressed into the capsules with a triple punch which accompanies the apparatus. In order to put on the caps the top table is lowered, which brings the top of the capsules above the surface. The accompanying illustrations show the several steps of the operation.

Joseph W. England exhibited a Gilchrist fruit jar, and spoke of its adaptability for preserving museum specimens owing to its wide mouth and the special construction of the cap in forcing out the air.

Among the specimens exhibited were unpeeled colocynth, yam starch used as an adulterant of ground mustard, and globular masses composed of the hairs of *nux vomica*, formed from the powdered drug by the process of sifting, all of which were received from Messrs. Gilpin, Langdon & Co. An aloe plant was exhibited, which was grown by Prof. Henry Kraemer, from a cutting obtained last year from Barbadoes by Mr. C. G. Lloyd, of Cincinnati.

On motion, the meeting adjourned.

FLORENCE YAPLE, *Secretary pro tem.*

MINUTES OF THE COLLEGE MEETING.

The semi-annual meeting of the members of the Philadelphia College of Pharmacy was held at the College, 145 North Tenth Street, on Monday, September 25, 1899. Twenty-three members were present, Wm. J. Jenks presiding. The minutes of the meeting of June 26th were read, and approved as read. The minutes of the meeting of the Board of Trustees for September were read, and approved as read.

Mr. F. W. E. Stedem read the report of the delegates to the meeting of the American Pharmaceutical Association, at Put-in-Bay, and, on motion, the report was received and ordered to take the usual course. (A full report of the proceedings of the meeting of the Association was published in the October number of this JOURNAL.)

Professor Remington called attention to the meeting of the International Pharmaceutical Congress, to be held in Paris in the summer of 1900; and also to the Pharmacopœial Convention, to be held in Washington, D. C., in May, 1900, which will have a larger number of pharmacists in attendance than ever before, due to a more liberal recognition of the claims of pharmacists for representation in this convention. He also stated that in view of this fact it was the sense of the Put-in-Bay meeting that it was desirable to hold the next meeting of the American Pharmaceutical Association in an Eastern city convenient of access to Washington, immediately after the close of the Pharmacopœial Convention, and, as the Association had not met in Richmond, Va., for many years, that city had been selected as the place of meeting, the exact date being left to the discretion of the officers of the Association.

Professor Remington spoke of the feeling of sorrow and sympathy for Professor H. Vin Arny that was manifested when his serious illness became known to the meeting at Put-in-Bay.


An election of Trustees being in order, Messrs. Harry L. Stiles, Joseph W. England and George M. Beringer were unanimously re-elected for a term of three years.

Professor Sadtler announced that the teaching year of the College would begin on October 2d, and that the number of matriculants was considerably in excess of those registered at the same time last year.

Professor Remington announced that Mrs. Mary Powers Harris had endowed a scholarship in the College in memory of her father, Thomas H. Powers. The scholarship provides for the education of one student each year at the College. This announcement caused great satisfaction to the members, and the hope was expressed that other endowments would follow.

On motion, the meeting adjourned.

W. NELSON STEM, *Secretary.*



THE AMERICAN JOURNAL OF PHARMACY

DECEMBER, 1899.

SOME PHARMACOPŒIAL PROBLEMS.

BY CHARLES RICE.

While each new Pharmacopœia, at the time of its appearance, represents, in a general way, the then existing state of therapeutic and pharmaceutical progress, there is, naturally, no lack of new problems, which continue to present themselves for consideration, not only after the work is issued, but sometimes also while it is still passing through the press. In the case of our own Pharmacopœia, a number of quite serious problems were encountered during the last two revisions, some of which, as, for instance, the admission of "patented" synthetics, were solved by the dictate of the National Convention, while others, such as nomenclature and standardization of all drugs except cinchona and opium, were left to the discretion of the Committee of Revision. The Committee endeavored to solve these problems to the best of its ability, and their decisions and action have, on the whole, met with approval on the part of competent judges. Among the more important problems which confronted the present Committee of Revision was that of emancipating the Pharmacopœia from the control of the publishing trade, and of setting it up on an independent financial basis. This problem may be regarded as definitely solved, and, therefore, may be omitted from consideration here. Disregarding the minor problems which affect the details and minutiae of the text of the articles contained in the Pharmacopœia, there remain certain subjects which stand out more prominently, and are worthy of general discussion. They are, moreover, of such a nature that they should be definitely

passed upon and settled by the National Convention, so that the next Committee of Revision will be relieved of all responsibility regarding their rejection or adoption. These subjects are not new, and have frequently been written and talked about. But, in the course of time, our knowledge has made material advances, some of our views have undergone changes, certain prejudices may have been abandoned, and conditions in general appear to have so changed that it is perfectly proper to disregard former arguments and deductions, and to consider the subjects anew.

The Pharmacopœia was originally intended to be the official guide both for the physician and the pharmacist. During the earlier period of its existence in this country the physician took a greater interest in, and had, at least officially, a larger share in its preparation or revision than the pharmacist. That this is no longer the case is generally known and acknowledged. While, theoretically, the medical profession has not lost its interest in it, and is well represented at every Decennial Convention, yet, practically, the Pharmacopœia has ceased to be a work of reference for the physician. And why? Chiefly because it does not contain the information which the physician requires regarding the nature, properties and doses of some of the most important remedies he uses. To a large extent he is himself responsible for this condition of things, for he has, very likely, been one of the large group of medical men who opposed the admission into the Pharmacopœia of the very things regarding which he needs information, and for which he must now look elsewhere. Most physicians do not take much interest in botanical or chemical descriptions, or in tests of identity and purity. The main objects which a physician usually has, or would have, for consulting a Pharmacopœia are to ascertain :

(1) What form or forms of administration are officially available in the case of a certain drug?

(2) What is the strength of the respective preparations?

(3) What are the ordinary doses?

Under present circumstances he may find in the book an answer to the first two questions, but, knowing that he will find none to the last-named one, which to him is probably the most important, he simply ignores the Pharmacopœia, and turns at once to sources which he has found by experience to afford the desired information. There is no use whatever in trying to make the Pharmacopœia bet-

ter known to, or "more popular" with, the physician, unless it is made worth his while to consult it. To restore the Pharmacopœia to its former status among medical men is a task which requires their co-operation in this, that the next Committee of Revision may be authorized to give the average *doses* in connection with the several drugs and preparations. It may be taken for granted that the Committee will exercise its best judgment in arranging this part of the text so that no harm can result to either profession.

The pharmacist, particularly at his prescription counter, also often has occasion to look for precisely the same information that the physician wants and, knowing that he would look for it in vain in the Pharmacopœia, he at once consults some other work of reference, preferably one which will give him at the same time all other needed information regarding physical or chemical properties, solubilities, incompatibilities, etc. Is it to be wondered at that the Pharmacopœia is not a "popular" book among pharmacists?

As to the so-called *Newer Remedies*, and more particularly the "patented" synthetics, a curious anomaly may be observed in the position taken with reference to them by many physicians, who in their daily practice freely prescribe such as trional, sulfonal, phenacetin and others, and who treat of them and advocate them in their medical writings and even on the lecture platform, yet who are disinclined to vote for their admission into the Pharmacopœia. This may be regarded as an ethical riddle. If the Pharmacopœia is to be gradually purged of old and useless drugs and preparations, and not to be brought up to date by the introduction of the newer drugs of recognized value used universally by the medical profession, it might just as well remain unrevised and go out of existence. Medical and pharmaceutical schools have for a number of years past found it necessary to supplement the official series of remedies from other text-books. The time might eventually arrive when the Pharmacopœia would cease to be of service even as a text-book in schools. In view of all this it can hardly be doubted that the next Decennial Convention will authorize the new Committee of Revision to introduce into the Pharmacopœia such of the *Newer Remedies*—irrespective of any consideration of patent rights, etc.—as shall be found worthy of a place therein. It will not be very difficult to decide their respective merits, because, if the following conditions are exacted in every case, the number that will deserve consideration will

probably be less than a dozen. The conditions or characteristics that ought to be complied with are the following :

(1) If the remedy is a definite chemical compound, its chemical composition and physical and chemical properties should be known and controllable. (Examples: antipyrine, aristol, chloralamide, phenacetin, salophene, sulfonal, trional.)

(2) It should have passed the experimental period, and should be in regular and general use by the medical profession as a remedy of a definite and recognized therapeutic value.

Statistics as to the regular and general use of any such remedy can readily be obtained from reliable sources, such as the larger dispensing pharmacies, large hospitals, the Government medical service, etc. As to how and under what titles these remedies are to be introduced is of minor importance. This may safely be left to the Committee of Revision.

In former times the Pharmacopœia was a work chiefly concerning itself with what its name expresses, namely, the *making* of medicines. At the present day the name has already become, at least partly, a misnomer, and the time may not be far distant when it should rather be called *Pharmaconomia* or *Pharmacographia*, that is, a book *prescriptive* for, or *descriptive* of, medicines. This gradual transition is, however, quite natural, and in normal proportion to the changes that have taken place in the condition and status of the profession of pharmacy. When we consider the exacting demands which are made at the present day, under various laws, upon the quality of medicines dispensed by pharmacists, it is not to be wondered at that the latter become more and more unwilling to assume full responsibility for the quality, and particularly the exact strength, of the preparations they dispense, but that they prefer to shift this responsibility upon the manufacturer, more especially when the latter assures them that he is willing to assume the responsibility himself. This matter of responsibility for the quality of medicines in combination with considerations of economy, particularly by the saving of time, space, labor and wages, has brought it about that the manufacture of certain classes of pharmaceutical preparations is becoming more and more concentrated in the hands of large firms, and that the function of the pharmacist—at least of the conscientious pharmacist—is chiefly confined to an examination of the preparations which he buys by means of such tests as are available to him.

Recognizing these conditions, modern pharmacopœias have, at each new revision, eliminated working processes for preparations which were known to have passed almost entirely into the large manufacturer's hands, and have substituted for them more detailed descriptions and tests. Among the tests, those which are intended to show the strength of the preparations by gravimetric or volumetric assays have been made more and more rigorous, and their application has been extended to drugs and preparations which formerly were not subject to strict regulations. The progress made in organic proximate analysis, notably during the past fifteen years, brought forth a demand for the *standardization* of the preparations of potent drugs, often, unfortunately, on the part of persons who were not sufficiently familiar with the technical difficulties that stood in the way of a more general application of the then known methods of assay. In 1890 the present Committee of Revision was directed to give processes of assay for two drugs only, namely, cinchona and opium, it being left at liberty to extend standardization to others. By the time the Committee was ready to go to press, only one more drug, viz., nux vomica, was added to the list, it being deemed unwise to proceed further at that time. Since then, however, a very material advance has been made in the methods of proximate analysis, and there is every reason to hope that processes of assay can be provided at the next revision for such drugs as belladonna, coca, colchicum, gelsemium, hyoscyamus, ipecac, physostigma, pilocarpus, stramonium, and perhaps some others.

The term "standardization" as applied to pharmacopœial preparations comprises three distinct features, which are not seldom confounded, and one of which is commonly overlooked. They are as follows:

(1) *Quantitative Determination of the Active Principles.*—The quantity of the active principle (or principles, as the case may be) in the drug or preparations to be standardized must be determinable by a fairly simple process yielding practically uniform results in different hands.

(2) *Identification of the Active Principle.*—It should be possible to identify the active principle by some fairly simple process. This applies, of course, only to preparations not made directly from the original drug, but purchased ready-made in the market, possibly of unknown or doubtful brand or origin. This is the feature which is

often overlooked. It is manifestly insufficient merely to determine the amount of alkaloidal or other active substance present, particularly in the case of preparations made from expensive drugs, unless it is shown that the separated principle is unaccompanied by matters foreign to the drug, such, for instance, as some cheap foreign alkaloid that might have been added to bring out a favorable "assay." While this feature (the identification) is quite important in actual practice, it can be disregarded in the Pharmacopœia, since the latter generally directs to start a preparation from the drug itself, about the identity of which there can be no question.

(3) *Adjustment of Strength*.—This is the final end and aim of "standardization." It is, of course, comparatively easy to standardize the preparations of any drug, the active principle (or principles) of which can be correctly determined quantitatively. It will merely be necessary to agree upon some definite strength or upon an upper and lower limit of the active principles. Of course, standardization need be applied only to drugs of importance and potency. There is no need of standardizing preparations of gential, quassia, sarsaparilla, squill, senna, etc., even if it were possible in each case to do this.

But there are some drugs which, with our present knowledge, it is not possible to standardize in the sense above mentioned. One of these is *Ergot*. It is claimed by some that its physiological action is due to Keller's "cornutine," and some manufacturers assay it and standardize it on the basis of this alkaloid. But it is not by any means certain that other principles in ergot do not participate in its peculiar action. Another case in point is *Digitalis*. We know that digitoxin is the most active of the cardiac principles it contains. But there is no certainty as yet that it is the only one that should be considered. If we knew for certain that the proportion of digitoxin to the other principles present in digitalis were at all times the same, we could accept it as a measure to gauge the activity of digitalis by. But even this point is not cleared up. And our experience with other drugs makes it likely that the proportion between the various principles of digitalis varies more or less at different times. *Strophanthus* may be mentioned as another drug for which we have no practical assay process. Realizing these facts, and yet desiring to give to their customers reliable preparations, some of the larger manufacturing houses have adopted the

plan of testing these and certain other drugs "physiologically." This is a quite laudable undertaking, and we have no reason to doubt that it is actually carried out. The method of testing employed by one of these houses has been published, but we have no knowledge as to the methods used by the others. It is safe to infer, however, that, as long as a *uniform* method of physiological testing (for each separate drug requiring it) has not been agreed upon, the products of the different houses will turn out to be uniform only by accident. It would be interesting to ascertain what results would be obtained by the several "standardizers," acting independently of each other, from samples of one and the same lot of a preparation, say of ergot, submitted to them without information as to the origin, age, or mode of preparation. Under present conditions it seems hardly probable that their results would agree. Who, then, shall standardize the standardizers? This is a problem for which a solution is sought but not readily found.

But whenever the medical profession will be able to offer methods of physiological testing which will show both the *quality* and the *quantity* of effect, and which are *accepted by a majority of competent judges*, then such tests may well be introduced into the Pharmacopœia, even if they should involve special skill and knowledge not possessed by the average pharmacist at the present time. By the time when such tests will have been brought forward and proven practically reliable, the conditions will probably have so changed that nearly all users of the Pharmacopœia will be able to apply them, or else such tests will have to be made only upon wholesale lots by some experts of acknowledged skill and reputation, whose verdict or certificate will be generally accepted. If physiological tests are to be applied to such drugs at all, it would manifestly be a waste of time, labor and valuable material for the pharmacist working on a small scale to test each separate small lot of a preparation when it is finished. He will find it much more advantageous to purchase either the drug itself or the respective preparation, already tested and "standardized" by some recognized expert assuming full responsibility for its standard. Although this standard will, no doubt, be affected by the "personal" error of the expert (until a method is discovered which will exclude or neutralize this error), yet the results will be comparable among themselves, and thus a practical uniformity attained. This shifting of the responsibility

back on the manufacturer would, in these particular cases, not be an evil to be regretted, but a positive gain, as it seems to be the only way by which a practical uniformity in such variable drugs as are mentioned above can be brought about.

To sum up, the writer offers the following recommendations:

(1) That the next Committee of Revision be authorized to introduce Doses into the Pharmacopœia (details to be left to the Committee).

(2) That the Committee be authorized to introduce such of the Newer Remedies as fulfil the conditions above mentioned.

(3) That the Committee be instructed to extend the principle of standardization to as many of the potent drugs, and preparations made from them, as may be found possible, but that no physiological tests be introduced at the next revision.

NEW YORK, November 14, 1899.

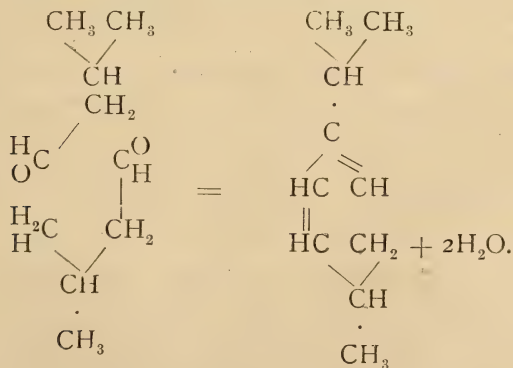
THE ANALYSIS OF ESSENTIAL OILS.

BY CLEMENS KLEBER,

Director of Fritzsche Brothers' Laboratories, Garfield, N. J.

The systematic analysis of essential oils is one of the youngest branches of organic chemistry. It is true that a number of the constituents of these oils have attracted the attention of chemists at a very early date, especially such as crystallize out from the oils on standing in the cold, like camphor, anethol, menthol and others, or such with a pronounced chemical function, like eugenol (then called eugenic acid, on account of its being combinable with alkali); but proper systematic researches in this interesting group of natural bodies were not possible before the excellent investigations of Wal-lach, Semmler, Tieman and others had furnished the clew for the separation and identification of the component parts of these peculiar substances. It is, however, still to-day impossible—and will, perhaps, in consequence of the complication and the peculiar nature of a great part of the substances in question, ever be so—to isolate, qualitatively and quantitatively, all the constituents of an essential oil by following a fixed scheme like that which has been worked out for an organic analysis, be it only for the reason that the list of bodies occurring in essential oils is still far from being complete, and that every new investigation may result in the detection of

hitherto unobserved compounds. It is even safe to say that not a single oil has yet been analyzed so thoroughly that, by further work, no new facts regarding the same could be detected, even if, as in the case of oil of peppermint, the sum of known constituents runs up to seventeen. There are still a great number of unsettled problems about essential oils towards the solution of which scarcely the first steps have been made, as, for instance: how far does the composition of the essential oil vary in the different parts of the same plant? How is it influenced by the conditions of soil, climate and cultivation? What is the variation in oils from the successive stages of vegetation of the plant? and at length, in what way, by what chemical processes does the plant produce all these so manifold compounds? Is each single one formed in a separate process, or do several or all constituents of an oil stand in genetic connection, being formed successively in one process? There are many indications for such a connection. Perhaps nobody will doubt that it exists between terpenes and terpene alcohols so often associated in essential oils; but the question is, are the terpenes formed from terpene alcohols by splitting off water, or the latter from the former by hydration? The frequent occurrence of small quantities of the lower aldehydes, like acetic and iso-valerianic aldehyde, and ketones in the oils seems to indicate that these bodies, which are so susceptible to condense with formation of unsaturated compounds of considerable complication, play an important role in the building up of various constituents of the oils; so, for instance, it seems possible that i-valeraldehyde might form terpenes:



But so far it has been impossible to effect any such or similar con-

densation by the means of the laboratory. Furthermore, it is a peculiar coincidence that, as a cursory review of the known constituents of essential oils shows, no less than 55 per cent. of those constituents possess ten carbon atoms in their molecules, while those with five and fifteen carbon atoms amount to further 15 per cent., and the entire remainder is only 30 per cent.; hereby those with ten atoms possess such a heterogeneous composition as terpenes, terpene alcohols and their aldehydes, menthol, camphor, thujone, pulegone, fenchone, cineol, carvol, carvacrol, anethol, eugenol, safrol, etc. It can hardly be assumed that this is a mere incident, but, though I do not think that nature itself believes in the decimal system, this fact seems to indicate a connection between the various processes by which these bodies are generated. Be this as it may, these few points just mentioned are sufficient to show how many problems of the chemistry of essential oils still are awaiting their solution, which probably will be greatly promoted by a careful and critical study of the constituents of a great number of essential oils, and that, therefore, still for a long time the study of these questions will afford an interesting and fruitful field for the efforts of chemists.

It is true, however, that such a study does not belong to the easiest tasks of analytical chemistry, and it is, therefore, necessary that the chemist who undertakes it first become thoroughly acquainted with the peculiar character of the respective compounds, if he wants to avoid the most fatal errors in his results. The overwhelming majority of these compounds contain so-called double bonds, and therewith possess, as thermochemical researches have shown, an excess of energy, in comparison to saturated bodies, which confers upon them the tendency to get transformed, under partial liberation of this excess of energy, into other more stable compounds. These circumstances account for the great inconstancy of many of the essential oils. Even at ordinary temperature resinification gradually sets in; oxygen is reabsorbed, at first with formation of ozone or bodies of super-oxyde-like character which further on effect oxidations, by which the whole character of the oil is changed; it loses its fragrance, becomes thicker and heavier, and more soluble in diluted alcohol, shows increased acid and acetylation figures, etc. But even if the access of air is excluded, changes will take place, especially under the influence of light; double bonds migrate, poly-

merization sets in, with increase of the specific gravity and decrease of the solubility, etc. Much quicker such changes will occur under the action of heat or of chemical reagents, and it therefore cannot surprise that in investigations of the components of essential oils, in which the use of heat and of chemicals cannot be avoided, often bodies are found finally which are quite different from those originally present in the plants. If the bodies into which an oil has been separated by an investigator are mixed again, the mixture will usually be quite different from the original oil, a sure proof that certain constituents have undergone changes during their isolation. There is even some doubt if the oil which is used for an investigation is really identical with the one originally present in the plant, or if it has not already undergone changes by the distillation with steam, the process generally used for the production of essential oils. That such changes actually occur is shown by the fact that every improvement in the technical preparation of the essential oils is accompanied not only by an increase of the yield, but also by an alteration of the properties of the oil. For example: when by the use of an improved distilling method, the time required for the distillation of cloves was reduced to about one-half, not only a higher yield resulted, but the oil also showed a finer fragrance and a materially decreased specific gravity, even considerably below the limits required by the U.S.P., so that for the latter purpose not the natural, but only fractionated distillates were available. Evidently by the former more imperfect process a part of the oil, apparently just substances of the finest aroma, had been resinified to much less volatile bodies and were thus lost. Upon this circumstance is based one of the difficulties to fix definite requirements for the properties of essential oils, as these properties largely depend not only on the variable crude materials which have furnished the oils, but also on the process by which the oils are obtained. If, for instance, as it has really been the case, a chemist obtains in his laboratory from cloves 7 per cent. of oil, while the improved technical distillation furnishes about 18 per cent., it is evidently an absurdity to proclaim the laboratory distillate as a standard for clove oil, because it consists only of the more volatile, respectively the more stable parts. This inconstancy of the composition of essential oils renders it recommendable to characterize an oil intended for analysis as completely as possible, so that, in case of different findings by other investigators,

the reason of such differences can be accounted for. It is therefore desirable to state: (1) Genus and species of the plant which furnished the material; (2) what parts of the plants have furnished the oil; (3) in what stage of growth, respectively at what time was the material collected; (4) how was the distillation effected (on dry or fresh material, after fermentation or not, with water or with steam, etc.); (5) how and how long had the oil been kept between preparation and analysis; (6) specific gravity; (7) optical rotation, refraction and dispersion; (8) solubility in alcohol of various strength; (9) saponification and esterification numbers. Some of these data furnish indications which will greatly facilitate the identification of the bodies resulting from subsequent fractionation. So, for instance, a specific gravity below 0.84 indicates the presence of large quantities of aliphatic compounds, like methyl-nonylketone in oil of rue, hexyl- and ethyl-alcohol and their esters in oil of heracleum. A specific gravity above 0.9 betrays the presence of oxygenated compounds, above 1.0, that of aromatic bodies, etc. Insolubility in 70 or 80 per cent. alcohol indicates hydrocarbons; insolubility in larger quantities of 90 per cent. alcohol, paraffines, sesqui- and polyterpenes. From the saponification figure before and after acetylation the amount of esters, lactones and alcoholic bodies may be estimated.

After this preliminary work, we may proceed to the proper analysis of the oil. It is, however, a useful rule never to use the whole of the oil at command for this analysis, but to reserve a good deal of the same, both for later reference or for the case, occurring even at the most careful work, that some fractions are lost by accident or decomposition from improper treatment. All processes to which the oil is subjected should first be tried with a small quantity, and only if the treatment is successful and results in the isolation of the supposed compound, the bulk of the oil should be subjected to the same process.

It has already been said that it is impossible to construct a general scheme for the analysis which would in all cases lead to the detection of all the constituents of the oil, and the result therefore largely depends on the practical experience, the skill and the divinator^y faculties of the chemist. As most of the components of essential oils possess a more or less pronounced odor, it is especially the sense of smell which greatly facilitates such kind of work, the more so, the better it has been developed by proper training.

There exist, however, besides this, some general points of view after which such an investigation can be conducted, and which we now come to describe.

As the overwhelming majority of essential oils have at ordinary temperature the liquid form, the most important process for their analytical treatment is fractional distillation. Useful and indispensable as the same may be, it is at the same time a very slow and imperfect process, and every other known method which leads to the removal of one or the other constituent should be made use of.

Many oils contain bodies which are solid at ordinary or lower temperatures, and will crystallize from the oil when it is exposed to cold. As such a treatment is not liable to effect decomposition, this method, if serviceable at all, should never be neglected. Often prolonged exposure to the cold of a good freezing mixture is required, with repeated stirring by means of a sharp glass rod. If the odor indicates the presence of a known crystallizable body, the crystallization will be accelerated by the addition of a minute fragment of that body. In this way crystals of borneol, menthol, safrol, anethol, apiol, etc., are obtainable, which are then separated from the liquid by a well-cooled filter or centrifugal machine. Naturally such a separation is never complete, and we always have to take regard to the dissolved parts during the further processes.

Hereafter, a sample of the oil is tested for the presence of aldehydes and some, especially methylic ketones, which are combinable with sodium bisulphite, and can thereby be isolated from the oil. This also should never be neglected, as many of these bodies will not stand the subsequent boiling with alkali, but are decomposed with formation of acid and alcoholic compounds, and would therefore falsify the result about the presence of acids and esters. The shaking with bisulphite solution must be continued for a considerable length of time, as some bisulphite compounds are formed very slowly (thujone for instance requires several days); addition of some alcohol often accelerates the reaction. Further attention is called to the property of some unsaturated aldehydes, like citral, citronellal, cinnamic aldehyde, to form solid bisulphite compounds which, upon standing, will combine with a second molecule of bisulphite, under formation of liquid compounds which sometimes cannot again be decomposed into their components; such bodies are therefore treated according to the rules given in the corresponding literature.

Some ketones and aldehydes, like acetone, acetic aldehyde, vanillin, yield, from the beginning, very soluble bisulphite compounds, which usually do not crystallize out; the aqueous solution should, therefore, by boiling with soda or sulphuric acid, always be tested for the presence of such soluble compounds; in the same way the aldehydes or ketones can usually be obtained from the solid bisulphite compounds.

Occasionally the latter form very disagreeable gelatinous masses, which are almost unfilterable; upon prolonged standing, with occasional shaking they usually are obtained in the crystalline state; also here the addition of some alcohol is often useful.

Now we proceed to the removal of acids and phenols by treatment with a caustic potash or soda solution. A very common mistake is here made in that an excess of concentrated alkali is used. This is quite unsuitable, because the alkali salts of the higher fatty and many other acids, also the alkali compounds of the phenols, are only little soluble in an excess of stronger alkali and will therefore either crystallize in masses which form very annoying emulsions, or will chiefly remain dissolved in the oil. Moreover, strong solutions of phenol-alkalies dissolve large quantities of many other compounds, even hydrocarbons, so that, for instance, oil of bay, which contains about 60 per cent. of eugenol and 40 per cent. of a hydrocarbon, will, with the proper quantity of a strong aqueous solution of caustic soda, yield a perfectly clear mixture, from which the hydrocarbons will only separate after the addition of much water. Therefore, only a 3 to 5 per cent. solution of alkali should be used and the oil extracted successively with small quantities of the latter, till a sample of the watery layer no longer becomes turbid upon acidifying. Even in such dilution the phenol-alkalies still dissolve notable quantities of indifferent substances; their solution must therefore first be extracted with ether, which, in its turn, even in presence of an excess of alkali, dissolves some phenol (so it is, for example, possible to extract from an alkaline solution of carvacrol, by often repeated treatment with ether, practically all of the phenol); this phenol must be extracted from the ether by renewed treatment with alkali. This alternate extraction has to be repeated several times to effect a fairly complete separation of the phenols.

If esters of phenol acids are present, they will likewise form unstable alkali compounds; that of methyl salicylate with soda forms

a white almost insoluble mass which is gradually saponified to sodium salicylate and methyl alcohol on heating, while the corresponding potassium compound is very soluble in water; upon acidulation of the fresh solution it forms again methyl salicylate, while upon standing of the solution the ester-salt becomes likewise saponified.

The alkali salts of the higher fatty acids, like lauric, myristic and palmitic acid, remain, at the alkali treatment, partly dissolved in the oil, and are later found in the residue from the steam rectification.

The purified alkaline solution is then acidulated with dilute sulphuric acid, whereby phenols and less soluble acids and phenols form an oily layer or crystalline masses; that part which remains in solution is obtained by extraction with ether or distillation with steam.

The mixture of acids and phenols can be separated by shaking their ethereal solution with a solution of sodium bicarbonate, which takes up only the acids, while sodium carbonate would also dissolve some phenols, like eugenol, etc.

The phenols which remain after evaporation of the ether can then be separated by fractional distillation and identified by their usually well crystallizing benzoates (prepared after Schotten-Baumann's method) or by the aldehydes and acids which result from the oxidation of their acetates or benzoates.

Solid acids are separated by methodic crystallization from suitable solvents; from liquid acids the dry alkali salts are prepared, these latter being then transformed into esters by boiling with alcohol and sulphuric acid; the resulting esters are then fractionated. The fractions of constant boiling point are hereafter saponified, then the silver salts prepared from the neutral solutions and analyzed by combustion.

In many oils which contain bodies with hydroxyl groups (alcohols and phenols), part of these latter are present as esters, chiefly esters of acetic acid; but also butyric, valerianic, benzoic, cinnamyllic and other esters are found occasionally. To the groups of esters, in their chemical behavior being quite similar to them, the lactones may be counted, which are quasi inner esters, the carboxylic and hydroxylic groups which have combined under formation of water belonging to the same molecule. To test an oil for the

presence of esters and lactones, about 5 grammes of the oil are boiled for an hour in a reflux condenser with 50 c.c. of a semi-normal solution of alcoholic alkali; subsequent titration with standardized sulphuric acid shows if hereby alkali has been neutralized. In the case of a positive result it is almost indispensable to saponify the whole oil before proceeding any farther, because some esters, like those of linalool, geraniol or terpineol, will not stand higher temperatures without being split, more or less, into terpenes and acids, the latter then effecting further chemical changes, isomerizing and resinifying terpenes, splitting off water from terpene alcohols and so on. It must, however, not be forgotten that by a prolonged action of alcoholic alkali in the heat, also some constituents without acid character are liable to undergo changes; linalool is partly destroyed with formation of acids, allyl groups are isomerized to propenyl groups (thus, for instance, safrol, methyl chavicol, apiol form the corresponding iso-compounds). The amount of alkali to be used should, therefore, be calculated from the result of the previous quantitative experiment, and any considerable excess carefully avoided. Heating on the water-bath for about half an hour will generally be found sufficient for a complete saponification. The alcohol is hereafter distilled off on the water-bath and the rest still remaining in the oil blown out with steam. From the distillate some of the more volatile parts of the oil are obtainable by rectification and washing with water.

The aqueous solution from the saponification (which should still be slightly alkaline) is then separated from the oil, the latter washed with water and the combined watery liquids which, especially when containing phenols, still hold some oil in solution, extracted with ether or distilled with steam. The remaining solution then contains the alkali salts of acids and phenols, also those of oxyacids, if lactones had been present.

To separate these groups, an excess of dilute sulphuric acid is added and the mixture boiled for some time in a reflux condenser, whereby the oxyacids again form lactones. After cooling, the whole is extracted with ether; the ethereal solution then gives off its phenols and acids when shaken with cold diluted caustic alkali, while the lactones remain behind on evaporating the ether. Phenols and acids are then separated according to the rules given above.

Now the number of group reactions, which lead to the separation

of special classes of compounds, is practically exhausted, and for further separation we have to resort to fractional distillation. As nearly all crude oils, however, contain some resinous matter, part of which may also have been formed by the foregoing treatment, it is better, before further fractionation, to rectify the remaining oil with steam. By this process we obtain a much more complete separation of the resin than by direct distillation, and we also avoid unnecessary overheating of the oil and formation of decomposition products; moreover, a crude fractionation of the oil is effected by collecting the subsequent distillates separately. The oil, which remains dissolved in the water, is recovered by cohobation. A careful examination of the residue from the steam distillation should not be neglected, as, besides undefinable resins, it may contain the alkali salts of higher fatty acids, which were not extracted by water at the removal of acids and phenols; also some other bodies of high boiling point, like paraffines, which have been blown over by the powerful steam currents of the chemical industry, but which resist the volatilizing power of the steam in a laboratory flask.

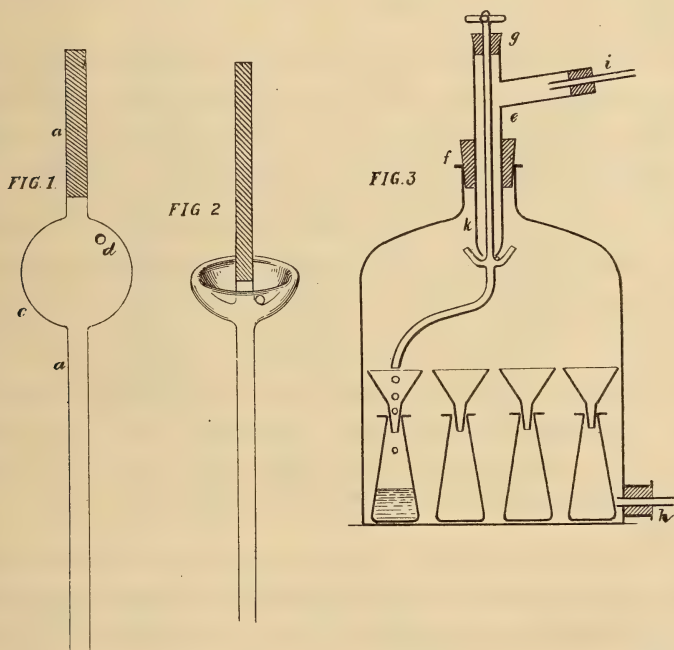
Now we proceed to fractional distillation. Invaluable as this method may be to the chemist, it is nearly always a slow and tiresome process, the efficiency of which is often overrated. Any one who stands for the first time before the task to separate, somewhat quantitatively, even only two bodies with a difference of, let us say, 15° in their boiling points, will probably be badly disappointed to notice how many times the fractionation has to be repeated, until the desired result is approximately obtained; and if he has once completed the task of thoroughly separating the constituents of such complex mixtures as essential oils usually are, and seen how many delusions he undergoes from fractionation to fractionation regarding the range of temperature in which the chemical individuals which are present are likely to boil, how often the main fractions are first collected at temperatures in the neighborhood of which, finally, nothing is present at all—any such one will only have an amused smile for the harmlessness with which sometimes even in chemical journals a judgment is passed upon the composition of an essential oil, merely from the result of one or two fractionations.

If the facilities of a laboratory render it possible, the fractionation of an essential oil should be performed as much as possible under reduced pressure. A vacuum of about 15 millimetres, which is

easily obtained by a good water jet pump, is the most recommendable arrangement, but also a pump of minor efficiency will render good service. Especially in the beginning of the fractionation the temperature of the boiling liquid is, in consequence of the presence of bodies of higher boiling point, so much higher than the true boiling point of the more volatile parts of the distillate, that the latter are very apt to undergo changes from overheating, even if in their pure state they are distillable without decomposition under ordinary pressure. Thus, for instance, it is sometimes impossible, with oils that give a strong phellandrene reaction, to find this hydrocarbon in any part of the distillate after some fractionating under ordinary pressure; it has completely disappeared by isomerization. Under the same condition pinene will partly be transformed into dipentene, myrcene will for the greater part be polymerized to diterpenes, which boil under decomposition only at a very high temperature, etc. In spite of the evident great advantages of the vacuum distillation, it is not used in the laboratory as much as it deserves, because many chemists consider the taking of fractions under a vacuum very inconvenient, on account of the interruption of the vacuum, though many forms of apparatus have been constructed which allow to change the receiver without such an interruption. It is, however, true that many of these constructions are either expensive or inconvenient, as they are very apt to break, difficult to be kept airtight, or provided with glass cocks which refuse to turn and rubber connections which stick fast or get dissolved by the vapors. It might, therefore, perhaps, not be useless here to describe an apparatus which I have had in use over twelve years and the construction of which is so simple that it can be made by any one with a little skill in glass blowing, from materials which are found in every laboratory; the apparatus is likewise so handy that it can be used to advantage even for fractionation under ordinary pressure.

An ordinary glass tube (*a*, *Fig. 1*) and a good round glass rod (*b*), both about the thickness of a pencil, are soldered together, and a bulb (*c*) blown out from the former, about 1 inch in diameter, and the latter provided with a hole (*d*). Now the upper half of the bulb is heated before the gas blast until soft and then forced down, so that a kind of double-walled cup, with a hole in the bottom of the inner wall, is formed (*Fig. 2*). Now we insert a glass tee (*e*) (about $\frac{1}{2}$ to $\frac{3}{4}$ inch) into the upper tube of an ordinary bitubular

exsiccator, by means of a good rubber cork (*f*), in the way shown (on a smaller scale) in *Fig. 3*, and into the tee the cup-piece before described, by means of a cork (*g*) saturated with paraffine and smoothly bored, after the lower end of the cup-piece has been suitably bent. The lower end of the tee, which reaches into the cup, is somewhat tapering, so that a small annular space is formed around the inner tube. The upper end of the glass rod is provided with some handle, which is made detachable, so that the glass rod can be pulled through the cork when the cup-piece needs cleaning. The use of the appa-



ratus is self-evident: after it has been evacuated through tube *h*, the distilling liquid enters through *i*, flows through the annular space into the cup and through the hole in the bottom of the latter, and subsequently through the bent tube into one of the receiving flasks, which have been placed in a circle on the glass plate of the exsiccator. The tee is, in the interior of the latter, on the side opposite from the inlet, suitably provided with a small hole (*k*), through which air entering with the distillate can escape, so that spattering out of the cup is avoided. To take a new fraction, all

that is necessary is to turn the upper handle till the liquid drops into the next receiver. The only piece of this apparatus that has to be moved during the operation is the glass rod in the cork, which always will turn easy and hardly ever leak.

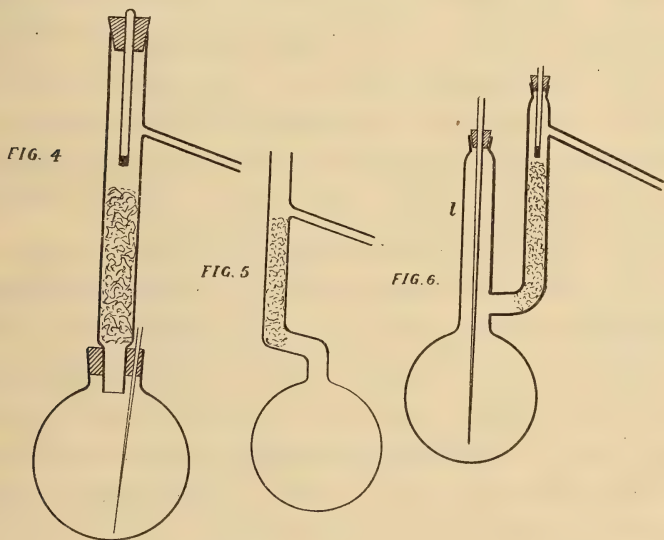
To regulate the vacuum if the water pressure should vary, a tee can be connected with *h*, one outlet of which leads to the pump and the other one, by means of a thick rubber tube, to a filter flask with lateral tube, which is also mounted with a rubber tube; by squeezing both rubber tubes more or less with adjustable pinch-cocks, any constant air pressure within the range of efficiency of the pump can be produced.

Due attention should also be given to the correctness of the thermometers, which often are all but accurate when bought from the dealer, and which, moreover, will undergo changes of the scale when used for high temperatures. They should, therefore, often be controlled by determining melting and boiling points of pure substances for which these figures are accurately known. The most suitable kinds are those made from Jena glass, recognizable by a lengthwise red line on the back of the stem; for all ordinary purposes they can be considered as correct and unvarying. If ordinary thermometers with long stems are used, the correction for the part not immersed in the vapors should not be neglected, at least for stating the boiling points of pure substances; such a correction becomes unnecessary by the use of short thermometers the scale of which begins at 60° or 100°, and can be immersed entirely into the vapors.

In order to accelerate the separation of liquids of different boiling points, a great number of dephlegmators have been constructed, many of which are quite serviceable, but sometimes apt to break or difficult to clean. Generally, I prefer a simple tube (*Fig. 4*), about $\frac{3}{4}$ inch wide, longer for low-boiling and shorter for high-boiling substances; near the upper end it has a lateral discharge-tube, near the lower end it is narrower, so as to offer a rest for some pieces of broken glass; upon these smaller fragments of glass, or short pieces of thin glass, tubes are filled, nearly up to the lateral overflow. For high-boiling liquids ordinary fractionation flasks are used, which are provided with an offset before the gas blast; the space between the latter and the lateral tube is again filled with broken glass (*Fig. 5*). For fractionation in the vacuum, when the

use of a capillary tube is indispensable, to prevent bumping, the form *Fig. 6* of flasks is very convenient; the tube *l* takes up the capillary. These flasks are an article of commerce.

To avoid overheating of the liquid and to secure a very even distillation, the use of a bath instead of the heating with free flame is recommended. A bath of any fatty oil, or of liquid paraffine, will generally be serviceable; more convenient, however, because of not being inflammable and not giving off any offensive vapors at high temperatures, is a bath from Wood's metal, which melts at about 60° C.; it is true that the first cost is somewhat high, but it will last a lifetime.



A very common fault of beginners is, to take from the start fractions within very narrow intervals of temperature, in the opinion thus to effect a quicker fractionation. Soon they then have such a large number of small fractions that the indications of the thermometer become quite uncertain because the rise in distillation temperature of the successive fraction is so fast that an exact reading off is impossible. Such a proceeding also appears to be quite misleading, if we consider the very imperfect separation during the first fractionations. It is much better first to divide the whole oil into four or five about equal fractions, without

much regard to their boiling points. The latter may be, for instance, 170° – 185° , 185° – 210° , 210° – 240° , 240° – 280° . Now we start again with the first fraction. It will begin to boil below 170° , say at 160° ; nevertheless we take again a fraction to 185° . At this temperature the flask will, at all events, still contain quite some liquid; we now add fraction 185° – 210° . On starting again, we are sure to find a lower boiling point than 185° , may be 175° ; that which passes over between 175° and 185° is added to fraction 160° – 185° . Now we take fraction 185° – 210° , add to the residue fraction 210° – 240° , and so on. In this way we obtain again only four fractions, but probably already in proportions rather different from those of the first distillation. It is quite safe to repeat fractionation within the same intervals for a third time. If certain fractions become specially strong, perhaps that of 160° – 185° , we divide it into fractions 160° – 172° , and 172° – 185° , otherwise the work is continued as above, always adding the next fraction to the residue in the flask when the lowest boiling point of this fraction is reached. It is recommended to keep all fractions in bottles of equal size, so that their relative proportion can be estimated at a glance.

Only if, upon further fractionation, the relative quantity of the fractions remains materially unchanged, we separate the distillates within smaller intervals, say from 5° – 5° . Gradually it then becomes noticeable about at what temperatures the boiling points of the individual constituent can probably be assumed, and the fractions are then taken in such intervals which are symmetrical to the presumable boiling points. In this way we proceed till all the single fractions pass over within intervals of 2° or 3° , which usually is the case after about a dozen fractionations. A rather good indication that a fraction consists of a fairly uniform body is that the distilling temperature becomes practically independent from the speed of distillation. In mixtures, a relatively greater part of the higher boiling bodies is run back by the dephlegmator at a slow rate of distillation rather than at a high one, therefore in the first case the vapors which pass over will have a lower temperature than in the latter, while, of course, with a body of uniform composition the distilling temperature remains unchanged at different speeds. To push fractionation much farther than to fractions within 2° or 3° is generally unnecessary, in the first line because, as it is evident for theoretical reasons, perfectly pure compounds cannot be obtained

by mere fractional distillation, and furthermore, because then the fractions are sufficiently pure to render their identification by other processes possible. To describe these processes would be quite beyond the limit of this essay; that which is required for the purpose is a careful study of the corresponding literature. I restrict myself here to giving a review over the more frequently occurring constituents of essential oils, arranged according to their boiling points under ordinary pressure, together with those of their derivatives which are advantageously used for their identification.

Boiling Point.		Melting Point.
21°	<i>Acetaldehyd</i>	—
	Aldehyde resin	—
56.5°	<i>Acetone</i>	—
92°	<i>i-Valeraldehyde</i>	—
	<i>i-Valerianic acid</i>	—
146°	<i>Styrol</i>	—
	Styroidibromid	74°-74.5°
151°	<i>Methylamylketone</i>	—
	(Oxidation with Cr ₂ O ₃)	—
155°-156°	<i>Pinene</i>	—
	Nitrosopinene	132°
	Nitrolpiperidin	118°-119°
	Nitrolbenzylamin	122°-123°
154°-156°	<i>Fenchene</i>	—
	<i>i-Fenchylalcohol</i>	61.5°- 62°
	<i>i-Fenchylurethane</i>	106°-107°
158.5°-161°	<i>Camphene</i>	48°- 54°
	<i>i-Borneol</i>	212°
161°	<i>Furfurol</i>	—
	Color with aniline and acetic acid	—
	Pyromucic acid	132°-133°
167°	<i>Myrcene</i> , d ₁₅ = 0.8023 n _D = 1.4673	
170°-171°	<i>Methylheptenone</i>	—
	Semicarbazone	136°-138°
171°-172°	<i>Phellandrene</i>	—
	Nitrite	105°
173°-176°	<i>p-Cymol</i>	—
	<i>p-Oxy-i-propylbenzoic acid</i>	155°-156°
	<i>p-i-propenylbenzoic acid</i>	255°-260°
175°-176°	<i>Limonene</i>	—
	Tetrabromide	104.5°
175°-176°	<i>Dipentene</i>	—
	Tetrabromid	124°-125°
175°-177°	<i>Sylvestrene</i>	—
	Benzylnitrolamin	71°- 72°
	Dichlorhydrate	72°

Boiling Point.		Melting Point.
176°-177°	<i>Cineol</i>	—
	Hydrobromid	56°- 57°
	Iodol compound	112°
	Cineolic acid	196°-197°
178°-180°	<i>Terpinene</i>	—
	Nitrosit	155°
	Nitrolpiperidin	153°-154°
	Nitrolbenzylamin	137°
178°	<i>Benzaldehyde</i>	—
	Benzoic acid	120°
192°-193°	<i>Fenchone</i>	—
	Oxime	164°-165°
196°	<i>Salicylic aldehyde</i>	—
	Disalicylic aldehyde	130°
197°-199°	<i>Linalool</i>	—
	Oxyd. to citral	—
203°	<i>Thujone</i>	—
	Oxime	54°- 55°
	Tribromid	121°-122°
205°-208°	<i>Citronellal</i>	—
	Semicarbazone	84°
	Citronellyl- β -naphtocinchonic acid	225°
206°	<i>Benzylalcohol</i>	—
	Phenylurethane	77°- 79°
207°-208°	<i>Menthone</i>	—
	Oxime	59°
	Semicarbazone	184°
208°-209	<i>Sabinol</i>	—
	Tanacetogendicarboxic acid	140°
209°	<i>Camphor</i>	176°-177°
	Oxime	118°-119°
212°	<i>Borneol</i>	203°-204°
	Phenylurethane	138°-139°
215°	<i>Menthol</i>	—
	Phenylurethane	111°-112°
215°-216°	<i>Methylchavicol</i>	—
	Homoanisic acid	86°
	Isomerization to anethol	—
217°-218°	<i>Terpineol</i>	—
	Phenylurethane	113°
	Nitrosochlorid	112°-113°
	Nitrolanilin	155°-156°
222°-223°	<i>Pulegone</i>	—
	Oxime	118°-119°
	Semicarbazone	172°

Boiling Point		Melting Point.
223°-224°	<i>Caroone</i>	—
	Oxime (opt. act.)	72°
	Oxime (racem.)	93°
	Phenylhydrazone	109°-110°
224°	<i>Methylnonylketone</i>	15°
225°-226°	<i>Citronellol</i>	—
	Oxyd. to citronellal	—
228°-229°	<i>Citral</i>	—
	Citryl- β -naphthocinchonic acid	197°-200°
	Citralidencyanacetic acid	122°
230°	<i>Geraniol</i>	—
	Calciumchloride compound	—
	Diphenylurethane	82°
233°	<i>Anethol</i>	21°
	Anisic acid	184°
233°	<i>Thymol</i>	50°- 51°
233°	<i>Safrol</i>	11°
	Heliotropin	35°- 36°
	Piperonylic acid	228°
235°-236°	<i>Carvacrol</i>	—
	Phenylurethane	140°
237°	<i>Chavicol</i>	—
	Methylation to methylchavicol	—
237°	<i>Cuminic aldehyde</i>	—
	Cuminic acid	115°
248°	<i>Anisic aldehyde</i>	—
	Anisic acid	184°
248°-249°	<i>Methyleugenol</i>	—
	Tribromid	78°
	Veratric acid	179°-180°
250°	<i>Cinnamic alcohol</i>	33°
	Oxyd. to benzaldehyde and benzoic acid	—
251°	<i>Peppermint lactone</i>	23°
	Oxyacid	93°
252°	<i>Eugenol</i>	—
	Benzoate	69°- 70°
258°-260°	<i>Caryophyllene</i>	—
	Hydrate	94°- 96°
	Phenylurethane	136°-137°
274°-275°	<i>Cadinene</i>	—
	Dichlorhydrate	117°-118°
	Dibromhydrate	124°-125°
282°	<i>Cedrol</i>	74°
285°	<i>Dill-apiol</i>	—
	Bibromide	110°
	Dill-iso-apiol	44°
294°	<i>Parsley-apiol</i>	29°
	Iso-apiol	55°- 56°
290°-300°	<i>Sequoiene</i>	105°

Compounds with boiling points not determined, or boiling with decomposition :

<i>Asaron</i>	62°
Dibromid	85°- 86°
<i>Cumarin</i>	67°
o-Cumaric acid	200°-202°
<i>Alantolactone</i>	76°
Oxyacid	94°
<i>Cinnamic aldehyde</i>	—
Anilid	109°
<i>o-Methoxy-cinnamic aldehyde</i>	45°- 46°
<i>Heliotropin</i>	—
Piperonylic acid	227°-228°
<i>Vanillin</i>	80°- 81°
Vanillic acid	207°
<i>Maticocamphor</i>	94°
<i>Kessylalcohol</i>	85°
<i>Santalcamphor</i>	104°-105°
<i>Cubebcamphor</i>	65°- 67°
<i>Guajol</i>	91°
<i>Ledumcamphor</i>	104°-105°
<i>Patchoulcamphor</i>	56°
<i>Ylang-Ylangcamphor</i>	138°

THE VALUATION OF VEGETABLE DRUGS AND FOODS.¹

BY HENRY KRAEMER.

(Concluded from No. II, p. 545.)

IV. BIOLOGICAL METHODS.

By biological methods for estimating the value of drugs is meant those methods which involve the consideration of the effect upon or the degree of resistance manifested by the animals or plants upon which experiments are made, or to which the drugs are applied or administered. Chronologically considered, the biological were the first methods employed in ascertaining the value of commercial products.

The valuation of perfumes, spices, beverages of all kinds, etc., had been performed until very recently solely by the expert "tasters," or those with cultivated senses of smell and taste. Adulteration and sophistication is carried on to such an extent to-day, however, that it is necessary in many instances to go a step further

¹ Presented in abstract at the meeting of the American Pharmaceutical Association, September, 1899.

in determining the value of the class of foods and drugs originally valued by this kind of "specialist." It is well, however, to remember that even to-day many commercial products are valued according to the appearance, taste, odor and feel as pronounced upon by experts.

Biological methods for the valuation of drugs may conveniently be brought into the following main groups with their subdivisions:

I. Effect or Influence upon Plants:

(A) Depending upon the dormant vitality of the plant or drug.

(B) Depending upon physiological effect upon plants.

II. Effect or Influence upon Animals:

(A) Depending upon the perception or senses of the experimenter.

(B) Depending upon the physiological effects upon animals, and including:

(a) Effects on insects.

(b) Effects on lower animals, as frogs, rabbits, guinea-pigs, dogs, etc.

(c) Effects upon man.

(I A) Beginning with the consideration of those drugs whose value seems to depend to some extent upon the vitality of the plant yielding them, we may mention seeds (including fruits) and fungi, as ergot. Unfortunately, the author has been hindered considerably in this work for want of authentic material. But sufficient may be said to indicate that there is a relationship between the duration of vitality of plants and the active principles contained therein. A. Juckenach and R. Sendtner, in an exhaustive investigation upon fennel fruits from different localities, find that the value of fennel may be ascertained in three ways besides the extraction of the oil: (1) They find that upon placing the fruits in water those fruits which are richest in volatile oil retain their color and odor. (2) The value of the fruits may be readily ascertained also by means of a microscopical examination. (3) They further find that from 70 to 80 per cent. of the fruits are capable of germination.

At first thought we may be inclined to say that the germination tests of drugs would require so much time that they would be value-

less.¹ But let us consider one instance, viz, seeds of castor oil. We all know how birds and other animals eat the seeds of castor oil in the fall when they are discharged from the capsules. The taste at this time is only slightly different from other oil-containing seeds. The physiological effects of the oil are, however, manifest in both lower animals and man. The question whether the oil in 80 or 90 or even a higher per cent. of germinating seeds is bland and agreeable and yet possessed of all the purgative properties of the oil ordinarily sold would seem to be worthy of investigation. There is probably no other purgative of such great value, and one the taking of which is dreaded so much as this one, and it would seem that the oil in the seeds capable of germination is equally purgative but pleasant in taste, and that the disagreeable odor and taste are rather due to decomposition products formed in the seeds no longer possessing vitality. The writer may be able to do some work along this line this fall, but would appreciate very much if others also would take up this subject.

A study of some other seeds, such as mustard, might also disclose some interesting facts, which would not be lost in that they would certainly interest the plant physiologist. It was, however, in the investigation of ergot that the author was more especially concerned and interested. It is well known that in the drug ergot we have a "sclerotium" or resting stage of a plant. From this "sclerotium" there is produced in the spring a number of club-shaped sporocarps, in each of which are developed asci, containing six ascospores. It is these latter which attack the flowers of the rye in the summer, grow upon the nutriment contained therein and produce with the harvest, in place of the grain, the "sclerotium" again, or what is known as the drug ergot. It has occurred to the author that one way of testing the authenticity of the year's crop of ergot would be to place the "drug" under a moist chamber and grow it like other fungi in order to develop the next generation. The difficulty is to get the ergot fresh. I append a few letters from prominent firms to whom I applied a year ago for ergot of that year's crop.

"DEAR SIR:—Your favor of November 11th is received, and we regret very much to reply that we cannot help you out in the way of

¹It is a customary practice to submit the barley used in the manufacture of beer to germinating tests.

samples of ergot. For the past two or possibly three years it has been very difficult to obtain fresh ergot, that is, of the year's crop then existing. This year we are having much more trouble than in the past, and two small lots we have already purchased for our next year's wants are of old crop and are somewhat wormy in parts. This we have to manipulate carefully by blowing the wormy parts out and sifting, and then put up in chloroform to secure it from further attacks by these little pests. We have no samples of either our present or past supply, for we grind it all up immediately after importing it in order to put it in the best condition for preserving in chloroform vapor in sealed packages, and then open each package when we make our fluid preparations from it."

"DEAR SIR:—Replying to your favor of the 11th inst., we regret that we have thus far been unable to obtain any ergot which we were satisfied was this year's crop. We can obtain any quantity of the article which is claimed to be this year's gathering, but have no means of verifying the statement, and as a consequence are somewhat inclined to doubt its authenticity. We will, however, make an effort to secure for you the desired quantity of this year's crop as well as of that of two years ago."

I also wrote to Dr. Erwin F. Smith, the well-known pathologist of the U. S. Department of Agriculture, for material, and asked him to give me the results of his experience in regard to the vitality of ergot. The following is an excerpt from his letter:

"DEAR SIR:—I cannot tell you just at present where you can get ergot that will grow. Only rarely have I seen it in abundance. The last time it came under my observation was something like five or six years ago, growing on rye in South Michigan. I could have collected a pint of it then without any difficulty. I will remember your wish should I come across any next summer, or if any is sent in to the Division.

"My impression is that ergot will not grow after one or two years. I have tried a number of times to get ergot six months to two years old to form the mature fruits, but have never succeeded, although with fresh material this ought not to be difficult."

This is as far as I have been able to go with this investigation; however, the facts recorded would seem to point to the inference that one test for good ergot would be that depending upon its germinating qualities, *i. e.*, producing the sporocarp of the next generation.

(IB) A most interesting field of operation in determining the value of drugs is opened up through the investigations of the botanists of the University of Wisconsin on the toxic action of various chemicals upon plants. The several papers by True, Kahlenberg, Hunkel and Heald, in the *Bot. Gaz.*, *Pharm. Review* and *Bot. Centralbl.*, are all deserving of careful study. We may say in a general way that "compounds which have a toxic effect upon animals are generally poisonous to plants, although we find different degrees of sensibility to the same compound in both plants and animals."

In analyzing the osmotic and toxic properties of different substances, True¹ compares them with cane sugar, proceeding as follows:

Different strengths of solution of cane sugar are made up, based on the molecular weight of the substance in the requisite number of liters required to give the concentration desired. He places *spirogyra* filaments for twenty-four hours in these solutions of different strengths and notes the strongest solution in which they will survive. This strength solution is termed by him the *boundary concentration*, and is regarded as *measure of the purely osmotic action capable of being sustained by spirogyra*. Having determined this point, he calculates, by use of methods in no way involving the living cell, the concentration of the solutions of other substances studied, which have an osmotic value equal to that of the experimental boundary concentration of cane sugar.

The results of experiments of this kind on different substances would indicate that (1) "if the algæ survived in a concentration greater than that calculated from the value of cane sugar, the conclusion would necessarily follow that the substance in question was less harmful to plants than sugar. This condition of things was in no case realized. (2) If the algæ first survived in the calculated concentration, the action of the substance would be purely osmotic and equal to that of cane sugar. (3) If the algæ should first survive in a concentration more dilute than the calculated boundary concentration, the substance in question would be more harmful than sugar."

"In the realization of the third case, injury by one or both of two possible methods might be wrought: (1) by a very rapid extraction of water from the cell violence might be done to the protoplasm

¹ *Bot. Gaz.*, 1898, p. 408.

through the lack of opportunity for the organism to accommodate itself to the change; (2) toxic action, due to the chemical interference of the substance in solution with the molecules of living substance, might also take place. In each special case it would be necessary to ascertain the kind of injury operating. In doing this certain plain considerations should be borne in mind. Should *spirogyra* be found to survive at a concentration greater than that causing plasmolysis and less than the calculated boundary, the deleterious action would in greater probability be due to the osmotic properties of the solution. If, however, the algæ should die in a concentration less in osmotic value than the cell-sap, *i. e.*, at a concentration weaker than the plasmolyzing strength, death could hardly be attributed to the water-extracting properties of the molecules or ions."¹

In the course of studies by Kahlenberg and True, using sodium salts of a number of acids, mainly organic, the boundary concentrations for *spirogyra* were obtained. A wide range of variation was found. In but one instance did a salt give a boundary concentration greater than 0.04 gramme molecule per litre (sodium hippurate, 0.08 gramme molecule per litre), and in a number of cases the algæ did not survive until a solution containing but 1 gramme molecules in 200 litres was reached, *viz.*, sodium cinnamate and sodium protocatchuate. In no case does it appear probable that osmotic action plays any noticeable rôle in bringing about the death of the plants; in all cases, therefore, practically toxic action only can be involved as the cause of death.

In addition to the experiments upon algæ, Kahlenberg and True² have used germinating seeds of *Lupinus albus*, and Heald³ has further worked with seeds of *Pisum sativum*, *Zea mays* and *Cucurbita*

¹ "The boundary concentration of cane sugar, the osmotic value of cane sugar and that of the substance in question being given, the boundary concentration would be found to be related to that for cane sugar inversely as the known osmotic values, according to the proportion

$$S : x :: ox : oS,$$

in which *S* is the boundary solution of cane sugar, *x* the boundary solution of the substance, *ox* the osmotic value of the substance, and *oS* the osmotic value of cane sugar."

² *Bot. Gaz.*, 1896, p. 81.

³ *Bot. Gaz.*, 1896, p. 125.

pepo. For details of the manner of study see Heald's paper. Sufficient is it to say that the roots of the germinating seeds, when about 20 millimetres long, are marked at a distance of 15 millimetres from the top by means of a fine brush and India ink. They are then held in perforations in a cork so that the root is immersed in the liquid of desired concentration and substance. Growth of seedlings is allowed to take place in a dark chamber with a nearly uniform temperature (21 to 23° C.). At the end of twenty-four hours the seedlings are removed and measured again. The roots are also examined for other symptoms of poisoning, besides the retardation or inhibition of growth. They are then replaced for another twenty-four hours, when measurements are again made.

The solutions of the various concentrations of different substances produce varying results. In the more concentrated solutions growth may not take place at all. In the more dilute solutions growth may be very rapid. In some cases there is a diminution in size of the root.

These writers have experimented with a large number of inorganic substances, and recently True and Humkle¹ have extended this method of study to that class of organic bodies known as phenols. They experimented with germinating seeds of *Lupinus albus* and *Spirogyra* with the following substances:

Phenol; phenol + 1NaOH; pyrocatechol; resorcinol; resorcinol + 1NaOH; hydroquinone; pyrogallol; phloroglucin; ortho-cresol; ortho-cresol + 1NaOH; meta-cresol; meta-cresol + 1NaOH; para-cresol; para-cresol + 1NaOH; carvacrol; carvacrol + 1NaOH; thymol; thymol + 1NaOH; orcinol; ortho-nitrophenol; ortho-nitrophenol + 1NaOH; para-nitrophenol; para-nitrophenol + 1NaOH; nitrobenzine; tri-nitrophenol (picric acid); sodium picrate; anisol; guaiacol; ortho-oxy-benzoic acid; sodium salicylate; methyl salicylate.

As a result of their work, they found that, "except in isolated instances, electrolytic dissociation plays but a very subordinate rôle in determining the toxic properties of substances. Picric and salicylic acids strongly dissociate and become powerfully poisonous, by virtue of the H ions, in great measure. Pyrogallol and, probably, methyl salicylate, first undergo other molecular changes, after which

¹ *Bot. Centralbl.*, No. 1898, 48-51.

their products dissociate electrolytically. Here the H ions may account for much of the toxic action. In the cresols and mononitrophenols, electrolytic dissociation seems to exert a pronounced influence. Some phenols are comparatively weak in this integrity, but quickly change to substances containing constituents even more fatal than H ions. Pyrocatechol, and especially hydroquinone, are of this class.

"Certain radicles seem to have specific properties when introduced into the molecule, modifying the toxic value. The number of hydroxyl groups (OH) present seems to have little influence on the toxic action of the phenols, as in the series benzophenol (OH), resorcinol (2OH) and phloroglucin (3OH). The introduction of the methyl group (CH_3) into the benzene nucleus increases the toxicity to a considerable but rather variable degree, as in the cresols, less plainly in orcinol. The introduction of the isopropyl group [$-\text{CH}_3(\text{CH}_3)_2$] into the cresols increases the toxic value of these substances, as carvacrol and thymol. The presence of one or more nitro groups (NO_2) increases the toxic action to a great degree; mono- and tri-nitrophenols. An increase in the number of the NO_2 groups present does not seem to increase the toxic action. When the H of an OH group is replaced by a (CH_3) group, little influence seems to be exerted on the toxic action, *e. g.*, anisol and guaiacol. The carboxyl group (COOH) brings with it a degree of toxicity corresponding directly to the degree of dissociation and the number of H ions it affords; salicylic acid."

It is apparent, from this brief review of some of the more important points of the work on the application of the theory of the dissociation of electrolytes to explain the toxic action of various substances on living organisms, that it has not only an important scientific interest, but one which is likely to yield in a practical manner some very important results. For instance, Kahlenberg and True recognized from the beginning the adequacy of this theory to explain the action of antiseptics, and later Paul and Kroenig¹ verified these views. Certain plants, however, show a marked sensitiveness to certain substances; for instance, spirogyra is far more sensitive to the heavy metals, but is more tolerant towards acids than the seeds of *Lupinus albus*. On the other

¹ *Zeitschr. f. physik. Chemie*, 1896, p. 414.

hand, spirogyra is less sensitive towards phenols than are lupines. It seems to the writer not at all unlikely but that we have here in the possible application of the work of True and others a field with unusual opportunities for study in the indirect valuation of some of our potent drugs.

(II A) The valuation of drugs by means of methods which call into play the senses of the investigator has the objection that the personal element is a variable one. Nevertheless, methods of this kind are still employed upon many commercial products and have a certain value in their ready or quick valuation. While these methods, as applied heretofore, have been more or less crude, it does not seem at all unlikely but that the time may come when certain departments of physiology and physics will contribute to our more intimate knowledge of substances and their effects upon the senses. This may be illustrated in noting the taste, odor, touch and color of the substance or its solution in some instances.

The author made some experiments to determine the least amount of substance which, when treated with a proper menstruum, would give the characteristic taste or odor of the drug employed.

(I) The following are the drugs upon which experiments were made to ascertain the weakest solution, a few drops of which would still give the characteristic taste.

(a) *Nux Vomica* (containing 2.25 per cent. of alkaloids).—0.100 gramme of finely powdered *nux vomica* is shaken in the course of several hours with 500 c.c. of water. Ten c.c. of this solution, diluted with 90 c.c. of water, a few cubic centimeters still possess appreciably the characteristic taste of *nux vomica*. One c.c. of this solution is calculated to contain 0.0000045 gramme of the alkaloids.

(b) *Cinchona* (containing 7 per cent. of total alkaloids, of which 3 per cent. is quinine).—0.500 gramme of the powder is mixed with 500 c.c. of water as above, etc. Ten c.c. of this solution are diluted with 50 c.c. of water, a few cubic centimeters are found to still give the characteristic taste of the alkaloids of *cinchona*. One c.c. of this solution contains 0.000005 gramme of quinine, or about 0.000011 gramme of total alkaloids.

(c) *Aconite Root* (containing 0.50 per cent. of aconitine).—0.500 gramme of the finely powdered *aconite* is mixed with 500 c.c. of water and shaken occasionally during the course of five minutes. A few cubic centimeters of the filtered solution, if swallowed, produce a distinct and characteristic sensation in the throat.

(d) *Gentian Root*.—0.500 gramme of the finely powdered drug is shaken with 500 c.c. of H_2O for a few hours. Ten c.c. of the filtered solution are diluted with 10 c.c. of water. A few cubic centimeters of this solution give the characteristic taste of gentian.

(e) *Calumba*.—The solutions of this drug correspond essentially to gentian, imparting, however, the characteristic taste of calumba.

(2) A very appreciable difference in the quality of some drugs containing volatile oils is manifest on treating 0.100 gramme of the drug with 1 c.c. of deodorized alcohol and noting the odor produced by a small quantity dropped on a piece of filter paper. In this manner the superiority of Penang to Zanzibar cloves is at once discerned. The differences in the odor of solutions of the cinnamons is probably even more marked.

On mixing 0.1000 gramme of black mustard in a porcelain capsule with sufficient water to moisten it, there is immediately developed a pronounced and persistent odor of the volatile oil of mustard.

(3) The sense of touch is employed by millers to some extent, but probably has more value as a qualitative test. Brokers who deal in cereals, however, use the sense of touch in the "doughing test," which is employed in determining the value of commercial flours.

(4) In regard to the employment of color as a test, it may be said that certain drugs and foods develop characteristic colors when moistened with water or alcohol or upon treatment with chemicals, as, for example, in the latter instance, the action of iodine and phloroglucin. The intensity of the colors produced is, in a measure, of quantitative as well as qualitative value.

(II B) We now come to consider what promises to be one of the most important problems involved in the valuation of drugs, viz., that of pharmacological assay. For our purposes the work may be divided into a number of classes depending upon the class of organisms that are affected. The following subdivisions may be made: (1) effects upon micro-organisms; (2) effects upon insects; (3) effects upon lower animals, as eggs of sea-urchins, fish, guinea-pigs, rabbits, dogs, etc.; (4) effects upon man.

(1) The study of the action of drugs upon micro-organisms, and the study of the products produced by these organisms, belongs

to bacteriology and pathology. Both of these branches may be looked upon as departments of biology. The antiseptic or germicidal effect of different substances upon harmful organisms is one of the most important subjects, from a practical standpoint, that may be considered. On the one hand, the study of the toxalbumins or proteid poisons of various micro-organisms, as well as of many higher animals, as snakes, spiders, etc., has opened up a particularly inviting field during the past ten years. The work of True and others, already referred to, has done much to clear up the mystery surrounding this subject, and we hope that the practical application of the work of these authors may be fully appreciated. By experiments of the nature proposed, the question can be satisfactorily answered, what is the least amount of antiseptic or antidote that is necessary to produce the neutralization of the poison or death of the organism producing the poison?

(2) The valuation of insect powder has been attempted in a number of ways, depending upon amount of ash, color and per cent. of extract, microscopical characters, direct effect upon flies and other insects. Probably the most satisfactory method is to take about 0.250 gramme of the powder, place it in a small homeopathic vial and subject an insect (say a fly) to its influence. The latter should be paralyzed in one minute and killed in about two or three minutes. Other insects, as cockroaches, beetles, etc., manifest more resistance to its effects, and may not be killed, according to J. R. Hill, for fifty or sixty hours. It is interesting to note from the experiments of J. M. Francis that much valuable substance may be lost unless experiments of this kind are carried out. He found, upon experimenting with three different powders: (1) made from the flowers only; (2) made from the stems only; (3) made from an equal mixture of flowers and stems, that when these powders were sprinkled or blown, by means of the "powder gun," on flies and other insects in traps, or on dogs infested with fleas, there was seemingly no difference in the rapidity of action or toxicity of that made from flowers and that made from both flowers and stems. The powder made from stems alone, however, appeared a little weaker, but even this showed a surprising activity.

These results point again to the fact that in practice what is desired is an insecticidal powder that will simply do the work, and

that the application of a powder that is stronger than is required means the wasting of that much material. No other means of testing powders and other substances possessing insecticidal properties is probably so valuable and so simple as that of subjecting insects directly to their action.

(3) The study of the effects of drugs upon the lower animals has been performed for a great many years. Frogs, rabbits, guinea-pigs, dogs, etc., have been experimented upon, and more or less valuable results have been obtained. The results of the experimental physiologist or investigator have not always agreed with those of the clinician. It is but natural, however, that differences should arise between these two classes of observers. The reason for this is as Dr. Cushny (in "Text-book of Pharmacology and Therapeutics," 1899, p. 18) says: "Doubtless there are often faults on both sides. The scientist sometimes insists too strongly on deductions drawn from a limited number of animal experiments and refuses to admit results which have been obtained in thousands of cases of disease by competent observers. On the other hand, the therapist often lays too little weight on the general principles governing the interaction of the drug and the organism. Both often exceed the limits of their provinces, the scientist in refusing to admit effects of which he has perforce but a small experience, the clinician in attempting to refute the deductions founded on experiments which he has no opportunity of verifying." "Fortunately for the progress of medicine and pharmacology, the scientific clinician is imbued with a desire to ascertain the methods in which drugs act, as well as to cure disease, and thus unites clinical observation with pharmacological research. It is to be anticipated that the results of the practical physician and of the experimental investigator will come into more complete accord as more exact methods of clinical research are used by the former and a wider laboratory experience is attained by the latter. But both methods are necessary for a complete knowledge of the action of a drug. Animal experiments cannot be dispensed with, for only thus can the action of drugs be ascertained in detail and expeditiously, and at the present time, when a new remedy appears almost every week, it is impossible to await the verdict of the clinics to separate the useful from the worthless, even if it were permissible to apply to the human subject drugs of unknown action and potency."

The words of Cushny, coming, as they do, from a physician, have necessarily considerable weight, and point to the conclusion that in many instances the effects of drugs may be most satisfactorily ascertained by laboratory experiments upon the lower animals. That qualitative results are obtained in this manner is not to be doubted. The question seems to be, are quantitative results which are of value likely to be obtained? From the experiments of True upon plants and of Loeb upon eggs of sea-urchins, fishes and other lower animals, we see no reason why approximate quantitative values of drugs and their preparations cannot be obtained. Even though the results may not represent all that is to be desired, we cannot but believe that they are of far more value in at least certain drugs than any other value of the drug that may be given.

There are a number of drugs, viz., ergot, ipecac, physostigma, strophanthus, digitalis, belladonna, Rhamnus purshiana, etc., whose efficiency may be probably best determined by studying their effects upon lower animals. The values obtained by this means mean more to the practitioner, and will dispel more or less of the uncertainty that attaches to the administration of these drugs or their preparations.

It is well known that the ophthalmologist has pharmacological values for the different mydriatics and myotics. In response to a request to Dr. Wendell Reber, of Philadelphia, for the relative potency of the different substances which affect the pupil of the eye, I received the following:

The smallest quantities in solution of these substances that will affect the pupil are: Homatropin hydrobrom., gr. $\frac{1}{30000}$; eserin sulph., gr. $\frac{1}{10000}$; atropin sulph., gr. $\frac{1}{150000}$; and hyoscyamin hydrochlor., gr. $\frac{1}{300000}$. Taking homatropin as the unit, the relative strengths of the mydriatics and myotics appear to be:

Pilocarpin	$\frac{1}{4}$
Eserin	6
Atropin	30
Hyoscyamin	75

Dr. Reber also informed me that the anæsthetic effects of the different anæsthetics were being calculated or measured by an æsthesiometer. The æsthesiometer, invented by Sieveking, consists essentially of two movable points, which, being placed upon the skin, or upon a mucous membrane, are approximated until the two tactile

sensations afforded by the two points are blended into one, and the patient says that but one point is felt. The distance between the two points, indicated on a scale attached to the instrument, is inversely proportional to the delicacy of tactile sensibility. Of course it is most used in hunting for anesthetic or hypesthetic (lessened sensibility) patches in the skin in suspected hysteria, but it has a distinct field of pharmacologic use in estimating the effects of local anesthetics, particularly on mucous membranes or over cutaneous areas subjected to hypodermic injections of the various candidates for anesthetic honors. Surely we must bear in mind that the world is not standing still and that the old physiology and physiological methods, based on theories which have not been satisfactorily demonstrated, are giving gradually way to the newer methods of research based on the results and experience of recent years.

We need not wonder that there are many who do not as yet comprehend the importance of biological assay, for it must be borne in mind that this subject is still in its infancy, and that it is only within the past few years that it has received any consideration at the hands of experimental physiologists.

(4) The results of the clinician represent those of experiment upon man in disease. It may be said that the experience of the ages has come down to us, each race and tribe contributing something of value. The Indian of Peru has taught us the value of cinchona and coca. The Hottentots, from their experience, found out the value of buchu, and examples of this kind can be multiplied. As new localities are explored, new drugs and foods are discovered which have been employed by the native inhabitants. Many more, however, are the discoveries of the present day in the laboratory of the chemist of either new constituents in plants or new synthetics, created by his synthesis, from other materials. The value of these new medicaments, however, is now first ascertained upon some of the lower animals, and it may be that experiments upon plants will show that some of this work, in at least determining the toxicity of the new compounds, may be satisfactorily done upon either germinating seeds or upon algæ.

V. OPTICAL METHODS.

The valuation of some drugs, and the products obtained from them, by means of the microscope, spectroscope and polariscope is

well known. We have already, in a previous portion of this paper, referred to the value of the microscope for this purpose. We may add, however, that not only are the spectroscope and polariscope valuable adjuncts in the examination of drugs, foods and preparations, but the micro-polariscope and micro-spectroscope each reveal certain characteristics which are deserving of greater attention than they have heretofore received. A mere mention is made of these facts at this time, and will be dwelt upon more fully in a subsequent paper.

CONCLUSION.

From this rather broad consideration of this subject, the value of which can only be confirmed in some instances by the experiments of future investigations and by the experiments of a number of workers, it is apparent that the valuation of the various medicinal substances is dependent upon a large number of very different methods, involving a knowledge of many branches of science.

The author is well aware that some of the methods proposed will have to be worked over very carefully before they can be adopted with any degree of authority. But it was considered desirable to bring this subject to a focus in this manner so that an opportunity might be afforded all of us to work along lines which, while involving the highest technical skill and training on the one hand, would, on the other hand, bring to light methods for the valuation of drugs which would be inexpensive and practicable to the retail pharmacist. It seems to the author that each drug has properties or constituents which will make it possible for it to be valued in one of the four general classes of methods proposed, viz.: (1) Chemical; (2) physical; (3) biological; (4) optical.

Each of these methods will be shown to have its limitations, and in some cases several or all methods may be advantageously employed.

While there are, no doubt, imperfections in this paper, still if, on the basis of the experiments already carried out by the author and other investigators, and as suggested in this paper, methods may be at least devised which will have a practical value to the retail druggist in either elaborating upon or approximately estimating the value of his purchases of vegetable drugs, the work upon the paper will not have been in vain.

EDITORIAL.

THE REVISION OF THE U. S. PHARMACOPŒIA AND SOME OF ITS PROBLEMS.

As the time for the meeting of the delegates of the Decennial Convention of the 1900 Pharmacopœia approaches, considerable interest in the work to be undertaken is manifested by nearly all of the members representing both the professions of medicine and pharmacy. That there are many problems to come before the Convention is very apparent, but there are some problems which are of more than ordinary importance and which will require for their final solution the most liberal conservatism on the part of the members of the Convention and of the Committee on Revision. Very fortunately we are able at this time to give our readers a paper (see this JOURNAL, p. 559) from the pen of Dr. Charles Rice, Chairman of the Committee of Revision of the United States Pharmacopœia, which will command thoughtful attention from all of the intelligent pharmacists and physicians of the United States. We may further add that the members of these professions throughout the world are anxiously awaiting the results of the decisions of the National Convention as well as the Revision Committee. With the revision of the Pharmacopœia for 1890 great advances were made. Every step that was taken was in the direction of true progress. The processes, tests, descriptions, etc., of drugs and chemicals were in general uniformly satisfactory. The emancipation of the Pharmacopœia from the publishing trade and setting it upon an independent basis, so that the proceeds might be used in the making of researches for the coming revision, was one of the wisest and most important steps taken.

The three most important problems which it will be the duty of the next National Convention and Revision Committee to act upon with all the force of imperative necessity are those treated by Dr. Rice.

It is recommended "that the next Committee of Revision be authorized to introduce doses into the Pharmacopœia (details to be left to the Committee)." This is not a new subject, but one which has been discussed on many occasions, and while we may say (1) that there has been little or no progress in establishing the subject of posology on a scientific basis; (2) that the pharmacist and physician are generally conversant with the more or less recognized doses of all the potent drugs in the Pharmacopœia; (3) that really the medicines on which the members of the professions desire greatest enlightenment as to their respective doses are not those that are likely to be inserted in the Pharmacopœia; (4) that it is almost as difficult to say what shall constitute a dose as what is a poison, and (5) that in those potent drugs and preparations which are not standardized, it is hardly possible to give accurate doses; it must be admitted, however, (1) that it would seem that the introduction of average doses into the Pharmacopœia of chemicals and isolated active principles is quite possible; (2) that the development of a system of average dosage ought likewise to be possible with the progress in improved methods in the standardization of the toxic drugs and their preparations; (3) that it may tend to develop more science and greater accuracy in every department of medicine; (4) that it will cause the conflicting statements as to doses of drugs by different investigators and writers to be reduced to a uniform standard, and finally (5) that it may, as Dr. Rice suggests, increase the interest of the physician in the work.

The second recommendation is that "The Committee be authorized to intro-

duce such of the newer remedies as fulfil certain conditions." It must be admitted by all who are cognizant of the progress in medicine during this century that some of our commonest vegetable drugs are recognized to be of greater value to-day than ever before; and that, while some newer plants have been introduced, the development of synthetic chemistry has given us a host of remedies, some of which are of exceedingly great medicinal importance, and apparently are deserving of pharmacopœial recognition.

In the third recommendation the Committee is "instructed to extend the principle of standardization to as many of the potent drugs and preparations made from them as may be found possible, but that no physiological tests be introduced at the next Revision." Ten years ago the subject of chemical standardization was being considered to some extent. The researches of a large number of investigators since that time have shown that concordant results may be obtained in the examination of certain drugs from the employment of similar methods of procedure, etc. We believe that the time is ripe for extending the principle of chemical standardization to other potent drugs than those recognized in the U.S.P. of 1890. In regard to the matter of standardization by any other than chemical methods, it would seem that the time is hardly ripe for such action. It is well for us to bear in mind, in the consideration of this matter of standardization, as well as other problems, that the National Convention and Committee on Revision are to consider that the research and practice of to-day is always a step in advance of the knowledge that is accepted. There always must be the experimental or "scouting" party in search for new truths, and these are the results that are apt to be upon every tongue, and in every office and shop, and oftentimes uppermost in the minds of those who are engaged in daily practice of the professions. But these things with their reports neither represent truth nor definite knowledge, nor anything that is certain and ought to be made pharmacopœial. This distinction can only be given these reports when this knowledge has been shaped into something definite and certain, and has been repeatedly confirmed by others.

While, therefore, we cannot expect the Pharmacopœia at present to be a popular book in one sense, it is difficult to say what the next ten years will develop. We are making remarkable progress in this country in educational work in both pharmacy and medicine, and it is certain that the Convention must act on these problems, so ably presented by Dr. Charles Rice, with more than usual wisdom and foresight, conservatism and liberality, in the interests of the professions, as well as arts of medicine and pharmacy.

REVIEWS AND BIBLIOGRAPHICAL NOTICES.

INDEX-CATALOGUE OF THE LIBRARY OF THE SURGEON-GENERAL'S OFFICE, UNITED STATES ARMY. Authors and subjects. Second series, Vol. IV. D—Emulsions. Washington: Government Printing Office.

This is the fourth volume of the second series of the Index-Catalogue of the Library of the Surgeon-General, and includes 9,628 author-titles, 8,829 subject-titles of separate books and pamphlets, and 28,316 titles of articles in periodicals.

PROCEEDINGS OF THE INDIANA ACADEMY OF SCIENCE, 1898. Editor, George W. Benton.

Besides the president's address, this volume contains abstracts of papers read at the fourteenth annual meeting on mathematical, physical, chemical, botanical, zoological, geological and general subjects. The papers are of an unusually high order, and the proceedings are a valuable contribution to science.

PRELIMINARY CATALOGUE OF PLANTS POISONOUS TO STOCK. By V. K. Chestnut. Reprinted from the annual report of the Bureau of Animal Industry for 1898.

This catalogue contains a list of plants known to be poisonous to stock, a list of plants probably poisonous to stock, and a list of plants suspected of being poisonous to stock.

ONE HUNDRED AND FORTY-EIGHTH ANNUAL REPORT OF THE BOARD OF MANAGERS OF THE PENNSYLVANIA HOSPITAL.

The report of the Board of Managers indicates a year of unusual activity in the work of the hospital. Two weeks after the late war broke out the use of the wards was tendered the Surgeon-General, and hundreds of soldiers were cared for. There were a larger number of patients admitted during the year than heretofore, there being 3,644 new patients received in the wards. A three-years' course is now required for graduation of nurses in the Pine Street Hospital, and an attendance on lectures and an examination by members of the Staff of Physicians. The officers of the Pennsylvania Hospital are: President, Benjamin H. Shoemaker; Treasurer, Henry Haines; Secretary, James T. Shinn.

SHALL PHARMACISTS BECOME TRADESMEN? By George J. Seabury.

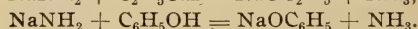
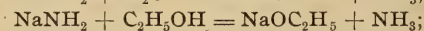
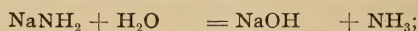
This book is a reproduction of a series of articles that appeared in the *Weekly Drug News* and *American Pharmacist*. They were written between 1880 and 1885, together with subsequent reviews on the same subject. The object of Mr. Seabury in reproducing these papers in book form is that they may prove interesting to a new generation of pharmacists and druggists, who, doubtless, are unaware of their existence. The majority of them were written between 1880 and 1883. His extenuation for the constant repetition and pleading for the pivotal foundation of power, unity and organization, was at that time, and still is, to engraft into the minds of pharmacists the stupendous results that are invariably achieved by concentrated power, activity, aggressiveness and vigilance, a power that should be formed into local, county and State organizations, and finally merged into a national association governed by State delegations. The book is written in an original and forcible style, and is intended to encourage the work of organization of all concerned in the progress and future of pharmacy and its trade interests. The author believes that an honestly upheld tripartite compact cannot fail to bring relief and success.

From the Wellcome Chemical Research Laboratories, Frederick B. Power, Director, the following pamphlets have been received:

THE ASSAY OF PREPARATIONS CONTAINING PILOCARPINE AND THE CHARACTERS OF PILOCARPINE NITRATE AND HYDROCHLORIDE. By H. A. D. Jowett. An abstract of this paper has already been given in this JOURNAL (see September, 1899, p. 449).

PREPARATION OF ACID PHENYLIC SALTS OF DIBASIC ACIDS. By S. B. Schryver. It is interesting to note that several of the products described may find applications for therapeutic purposes.

A NEW METHOD FOR THE ANALYSIS OF COMMERCIAL PHENOLS. By S. B. Schryver. A method was described a few years ago by A. W. Titherley (*Trans. Chem. Soc.*, 1894, **66**, 504) by which the reagent sodium amide, NaNH_2 , could be prepared pure and in considerable quantities without difficulty, and some of its reactions were noted at the same time. Amongst others, it is known that it is capable of acting on bodies containing the hydroxyl group, replacing the hydrogen by sodium, evolving at the same time ammonia. Its action on water, alcohol and phenol may be represented respectively by the three following equations:



It is thus evident that for every hydrogen atom replaced in this way, one molecule of ammonia is evolved. The principle of the method proposed by Schryver consists in the treatment of a phenol in a solution of a substance having no action on sodium amide by an excess of this reagent, and estimating the ammonia evolved by the ordinary volumetric methods. Benzene was the liquid usually employed, and the apparatus is diagrammatically figured in the paper.

ANATOMICAL CHARACTERS OF THE SEEDS OF LEGUMINOSÆ, CHIEFLY GENERA OF GRAY'S MANUAL. By L. H. Pammiel. *Trans. of the Academy of Sci. of St. Louis.* Vol. IX, No. 6.

The author has confined his studies to genera and sub-genera. While some excellent morphological and anatomical characters have been found, yet the author finds it often difficult to differentiate closely related species.

CONTRIBUTIONS FROM THE UNITED STATES NATIONAL HERBARIUM. Vol. V, No. 4. United States Department of Agriculture, Division of Botany.

In this volume are contained: "Studies of Mexican and Central American Plants," by J. N. Rose; "Two New Species of Plants from the Northwestern United States," by L. F. Henderson; "Hesperogenia, a New Genus of Umbelliferæ from Mount Rainier," by J. M. Coulter and J. N. Rose; "Three New Species of Tradescantia from the United States," by J. N. Rose; "Treleasea, a New Genus of Commelinaceæ," by J. N. Rose; "Notes on Useful Plants of Mexico," by J. N. Rose.

THE BASKET WILLOW. By Edmund Hersey. *Bulletin of the Bussey Institution.* Vol. II, Part 8. 1899.

During the forty-six years that *Salix purpurea* has been grown by Mr. Hersey, it has proved to be one of the surest crops the farmer can grow, and also a profitable crop where the osiers are in demand for various manufacturing purposes.

MISSOURI BOTANICAL GARDEN. Tenth Annual Report. St. Louis, Mo.

This report contains, besides the usual reports of the officers, several scientific contributions by F. Lamson Scribner and H. von Schrenk, and a biographical sketch of Edward Louis Sturdevant. An index for Vols. I to X is also incorporated, which will be recognized of inestimable value to all who consult these valuable contributions.

From the École Supérieure de Pharmacie the following publications have been received :

RECHERCHES SUR L'ÉMULSINE. Par Eugene-Henri Hérissé.

This thesis deals with the distribution of emulsin in the various members of the plant kingdom ; its preparation, properties and reactions.

NOUVEAUX COMPOSÉS CONTENANT UN MÉTAL ET PLUSIEURS HALOGENES DIFFÉRENTS. Par Camille Lenormand.

In this paper are given the results of studies upon some of the halogen compounds of iron and tin : $\text{Fe}_2\text{Cl}_4\text{Br}_2$; SnCl_2I_2 ; SnBr_2I_2 ; SnCl_2Br_2 .

RECHERCHES SUR LA CRISTALLISATION DE L'OXYHEMOGLOBINE ET DE L'HEMOGLOBINE. Par Charles Rouchy.

This paper deals with the influence of the various substances of the blood and of the use of various solutions in effecting the crystallization of oxyhemoglobin.

LES EAUX DE VERSAILLES (DE 1895 À 1899). Par Eymard Lacour.

This thesis deals with the history and a chemical and bacteriological examination of the drinking water of Versailles.

RECHERCHE DU COLI-BACILLE DANS LES EAUX ET CONTRIBUTION A L'ÉTUDE DE CE MICROBE. Par Joseph-Louis Gaudin.

The author has made an elaborate examination of the organisms in the waters from different sources by cultivation upon the various culture media, and he has obtained forms of *Coli-Bacille* which were very virulent as well as not pathogenic at all.

RECHERCHES SUR LES ORGANISMES MYCÉLIENS DES SOLUTIONS PHARMACEUTIQUES. Par Fernand-Pierre Guéguen.

The author has made a careful biological study of *Penicillium glaucum*, growing this fungus in a number of different solutions.

MINUTES OF THE PHARMACEUTICAL MEETING.

The regular Pharmaceutical Meeting was held Tuesday, November 21st, with Dr. Richard V. Mattison, a well-known member of the College, in the chair.

A very important paper on "Some Pharmacopœial Problems," by Dr. Charles Rice, Chairman of the Committee of Revision of the U. S. Pharmacopœia, was read on behalf of the author by Prof. Jos. P. Remington (see page 559).

Alluding to the paper in a general way, Professor Remington said that it was one which would be largely copied and read, and that it was a matter for gratification to have such an authoritative communication presented at this time.

During the reading of the paper Professor Remington incidentally referred to the work of the Philadelphia delegates to the Convention in 1890, who recommended that, instead of giving the profits to some publishing house, the Committee themselves publish the Pharmacopœia and appropriate the funds thus accruing for carrying on the research and other work of the Committee of Revision, and that as a result of this method a surplus would be reported at the next meeting of the Convention.

Remarking on the recommendations made by Dr. Rice in summing up his

arguments, Mr. Geo. M. Beringer said that the Philadelphia College of Pharmacy was on record as having favored the first and second of the propositions, that in the Convention of 1890 the delegates had recommended the introduction of minimum and maximum doses into the Pharmacopœia. With regard to the third recommendation, he said that he recalled a hint thrown out by the late Professor Maisch at the meeting to the effect that some spurious alkaloid might be added to a preparation to make it conform to a certain standard. The speaker endorsed the proposition and favored the adoption of both quantitative tests and tests of identity for standardized preparations.

Professor Remington said that the pharmacists went into the Conventions of 1880 and 1890 determined to urge the introduction of doses, and that the question was argued both in Committee and in Convention, but that we were beaten both times. The physicians objected seriously to having doses in an official work, as this would interfere with their giving as large doses as they might want to, and that as a result they might be liable to be called upon to answer charges of malpractice.

The speaker said that one reason why druggists favor the admission of doses is because it would enable them to prescribe over the counter with more authority. While admitting that we have numerous convenient dose books, he said that they are not official, and that this is the point which has an important bearing on the legal aspects of the question. He remarked also that the question had come up in the American Pharmaceutical Association, and that some of those on the affirmative side argued that some doctors ought to get into trouble for their carelessness in prescribing. Finally, he thought that physicians ought to exercise more care in marking exceptional doses.

Dr. Clement B. Lowe favored the admission of doses, and said that they had been in the British Pharmacopœia for one or two decades, and that he was not aware of English physicians suffering any annoyance on this account.

The recommendations proposed by Dr. Rice were then voted upon, and unanimously endorsed by the meeting.

A very interesting paper by Dr. G. T. Moore, of Dartmouth College, on "Algæ as a Cause of the Contamination of Drinking Water," was presented in the absence of the author by Dr. Henry Kraemer, and will be published in full in the January issue of this JOURNAL.

Before presenting the paper Dr. Kraemer said that Dr. Moore is a graduate of Harvard University, and that he has been associated with Dr. Farlow in his work on cryptogamic botany, and has had considerable experience in studying the plant forms in the waters around Boston and in New England, and hence was qualified to speak with authority on the subject of the paper.

The paper was rendered additionally interesting to the meeting by reason of the fact that Dr. Kraemer exhibited some growing specimens of algæ and made blackboard drawings of the principal forms described.

The principal groups considered by Dr. Moore were the "blue-green algæ," now classed with the bacteria in the Schizophyta, the diatoms and the class of Syngeneticæ, which until recently was considered to belong to the animal kingdom. The only genera among the unicellular group which are likely to cause trouble are *Cœlosphaerium* and *Clathrocystis*, whereas among the *Hormogonæ* a number of genera—particularly members of the nostoc tribe—cause various tastes and odors in drinking water. Among the diatoms only

a few are known to contaminate drinking water, giving rise to certain aromatic odors resembling fish or geraniums. Among the Syngeneticæ, *Uroglena* may be said to cause more trouble in water supplies than any other organism—either plant or animal. *Synura* is responsible for the “ripe cucumber” odor which was formerly thought to be caused by fresh-water sponges.

In some remarks on the paper, Dr. Mattison said that he would have been glad if the author had given or suggested methods whereby the troubles caused by the presence of algæ in drinking water could be eliminated. He said he supposed that it was generally known that while algæ give off oxygen, they also take up oxygen from the water, and this latter action, when in excess of the former, may render it flat to the taste. In addition, some of them give rise to other products, as mentioned by Dr. Moore, which have a deleterious effect upon it. He also spoke of a statement contained in the paper in regard to the condition of water in spring and fall, when it is said to turn over, owing to the different degrees in density caused by the changing conditions of temperature. He referred to the trouble in the Boston water supply some years ago, which caused intense excitement among scientists and people generally throughout this country. The fact that the malarial organism is transmitted through water is now generally admitted.

At the close of the discussion Dr. C. B. Lowe called attention to a copy of a work on “Cowpox,” by Edward Jenner, the discoverer of vaccination, which was published in London in 1798. The publisher was Sampson Low, whom the speaker said was probably an ancestor of his. Jenner seems to have had an idea of aseptic vaccine, for he spoke of the deleterious effects produced by vaccine which a physician had carried around in his pocket. A feature of the book was the beautiful colored plates.

Among the specimens exhibited was one of *Aralia Californica*, presented by Josiah C. Peacock, and specimens of vegetable drugs, by C. H. La Wall. A specimen of Italian fig was also exhibited by Mr. Ross.

On motion, the meeting adjourned.

FLORENCE YAPLE,
Secretary pro tem.

OBITUARY.

THOMAS GREENISH.—On September 28th, Mr. Thomas Greenish, F.C.S., F.R.M.S., one of the most highly esteemed of English pharmacists, died in London, in his 82d year. He was born in Pembrokehire, and his early education was obtained in a school of the neighborhood. Later he was apprenticed to a chemist and druggist at Brecon, where he remained for five years. After his apprenticeship he went to London as an assistant, first with Messrs. Dal-mahoy, of Ludgate Hill, but was soon transferred to Messrs. Godfrey & Cook, of Conduit Street, where he remained about seven years. In looking over Mr. Greenish's career in after years, it cannot but be regarded that this was a very important period of his life, for the course adopted by him at this time was pursued during the remainder of his life with much regularity. He was fortunate in becoming acquainted with the late William Ince soon after his arrival in London, and through the latter's influence became associated in the work of the Pharmaceutical Society from its origin, it having been

founded in 1841. He took the Society's course in pharmacy, and in 1847 became a member under its charter. This same year he left the Conduit Street house and purchased the business of Mr. Sterry in New St. Dorset Square, of which he remained the proprietor for the remainder of his life. It may be mentioned here that he also became the proprietor of the Conduit Street store about twelve years ago. Mr. Greenish soon manifested much interest in the work of the Pharmaceutical Society, contributing many papers to the evening meetings. He was elected a member of its Council in 1871, serving continuously to 1895, when he resigned on account of failing health. He was President of the Society from 1880 to 1882. In 1874 he attended as delegate of the Society the International Pharmaceutical Congress at St. Petersburg, and it was through his instrumentality that the Congress met in London in 1880. Mr. Greenish was one of the best known of English pharmacists on the continent of Europe, having made many visits there. He was a strong advocate for the better education of pharmacists. In the conduct of his own business he made many of the products not usually made by the dispenser, including such substances as amyl nitrite, etc. He devoted considerable attention to the use of the microscope, and believed in its employment as an aid in pharmaceutical research.

Mr. Greenish was an honorary member of the American Pharmaceutical Association, and in 1884 was elected an honorary member of the Philadelphia College of Pharmacy. He was also an honorary member of various European pharmaceutical societies.

GRANT ALLEN, one of the most voluminous and versatile of modern writers, died at Hindshhead, Surrey (England), on October 25th. He was born in Kingston, Canada, in 1848, and was educated in the United States, in France, King Edward's School, Birmingham, and Merton College, Oxford, where he was graduated with honors in 1871. He began to publish at an early date, and soon acquired a reputation as a popular writer upon scientific subjects, especially the Darwinian theory of evolution. It was in 1884 that he began to write fiction, and, while his contributions to this class of literature were numerous, it was as a scientific writer that he performed his most notable and enduring work. The reason for this lies in the fact that he loved science and wrote fiction for the purpose of securing an income. Some of his botanical works are used by teachers, and of his writings we may mention "Physiological Æsthetics," "The Color Sense," "The Evolutionist at Large," "Flowers and Their Pedigrees," "Charles Darwin" and "Force and Energy."

ALCORNOCO BARK.—C. Hartwick (*Schweiz. Woch. Chem. Pharm.*, 1899, p. 27) describes the product of *Bowdichia virgilioides*, Kunth. (N. O. Cæsalpinaceæ), a South American plant, possessing more active properties than jaborandi leaves.

CULTIVATION OF IPECAC IN INDIA.—David Hooper (*Ph. Jour.*, London, 1899, p. 384) records the fact that *Psychotria Ipecacuanha*, when grown in phosphatic manure of India, produces double the amount of root (by weight) than when grown in natural soil.

INDEX¹

TO VOLUME 71 OF THE AMERICAN JOURNAL OF PHARMACY.

SUBJECTS.

Accident, railroad	xxi
Acetracts, fluid, in comparison with fluid extracts (<i>Thompson</i>)	47, 67
Acetyl-benzaconine, physiological action of	286
Acetylene gas-flame, action of, on platinum	274
Acid, acetic, as a substitute for ethyl alcohol in the extraction of drugs (<i>Squibb</i>)	I, 305
in syrupus Pruni virginianæ (<i>Remington</i>)	209, 255
extracts, observations on (<i>Thompson</i>)	205, 206
carbolic, decolorizing reddened solution of	280
gauze, assay of	83
poisoning	477
citric, detection of	275
hydrocyanic, absence of, in <i>Mitchella repens</i>	81
in various plants	iii
recovery from a large dose of	39
malic, of the crassulaceæ	278
oxalic, stability of solutions of	486
phospho-glyceric, ready decomposition of	iii
salicylic, gauze, assay of	84
stearic as a preventive of emulsification of alkaloidal solvents	112
sulphuric, preparation of standard solutions of	484
tartaric, determination of, in presence of citric acid	xiv
Acids, action of hydrogen on	x
tartaric, separation of	189
some official fluid, examination of	141
Acidum aceticum, examination of samples of	141
hydrobromicum dilutum, examination of samples of	142
hydrocyanicum dilutum, examination of samples of	142
hypophosphorosum dilutum, examination of samples of	143
lacticum, examination of samples of	143
phosphoricum dilutum, examination of samples	143
sulphuricum aromaticum, samples of	144
sulphuricum, examination of samples of	143
sulphurosum, samples of	144
Aconine, physiological action of	286
Aconite in tormentilla	87
presence of tormentilla in	48
Aconitine, pharmacology of	286
Aconitum columbianum, Nutt., distribution of	xi
Air, liquid, as a drink	xxxvi
in workrooms, improvement of	xxiv
the upper regions of	ix
Alcornoco bark	606
Alcohol as a disinfectant	vi
Aldehyde, citriodoric, formula of	34
Algæ as a cause of the contamination of drinking water (<i>Moore</i>)	604

¹Compiled by F. Yaple.

Algal flora of the Hamburg water-works	xxvi
Alkaloidal assays, certain, directions for (<i>Gordin and Prescott</i>)	462, 498
Alkaloids, estimation of, and the assay of alkaloidal drugs (<i>Gordin and Prescott</i>)	498, 514
extraction and estimation of	14
localization of	173
mydriatic, the	283
Allo-lemonal, formula of	34
Alochrysin, oxidation product of aloin	547
Aloe-emodin, preparation of	546
Aloes plant, specimen of	558
Uganda	510
Aloin, a study of	546
Althæa, limed	189
Aluminum acetate solution, preparation of	230
American colleges, bequests for	xxi
Pharmaceutical Association	98, 296, 405, 491, xxxv
Philosophical Society	294
Ammonia as a fire extinguisher	xix
determination of, in water	160
Ammoniac, tests for	85
Ammonium di thio-carbonate, as a substitute for hydrogen sulphide in analysis	434
Andropogon citratus, oil of	34
Anemonin, derivation of	xvi
Anhalomin, new base found in Anhalonium lewinii	413
Anhalonium lewinii, alkaloids of	413
Anilin stains for bacteriological work	301
Animals, certain, immunity of, to poisons	147
Anison, the new anesthetic	233
Ants, secretion of formic acid by	xxvi
Apocynum cannabinum, physiological action of	90
Aralia californica, specimen of	605
nudicaulis, the oil and terpenes of (<i>Alpers</i>)	370
Araliene, a sesquiterpene of Aralia nudicaulis	378
Araroba, commercial, composition of (<i>Dowzard</i>)	453
Arsenic in tea, estimation of	xiii
Asafetida, tests for	85
Asbestos, specimen of	207
Ash, percentage of, in various drugs	82
Aspirin, preparation and properties of	461
Assay of belladonna leaves, and some of its preparations (<i>Moerk</i>)	105, 151
process for nux vomica, an	10
Atropin, relation of, to hyoscyamin	284
Atroscin and i-scopolamin	xiv
Atrosine and scopolamine, comparative experiments with	39
Bacteria in ground water	vii
relation of, to vital processes	94
Bacterial diseases, prevention of the spread of	xxiii
Bacteriological investigation, attack on	xxiii
Balance, an assay	xxxvi
Balsam Peru, investigation of	229
Balsams, true, definition of	273
tests for	85
Bark, wild cherry, variability in quality of	255
Bean pods, cause of blackening of	281
Belladonna acetate, efficiency of	47
and nux vomica, advantage of standardized preparations of	39
leaves, assay of (<i>Moerk</i>)	320, 356
and preparations, assay of (<i>Moerk</i>)	105, 151

Belladonna leaves, improvement in method of assay of	395
plaster, the pharmacopœial standard for (<i>Smith</i>)	32
plasters, assay of (<i>Henderson</i>)	454
Benzaconine, physiological action of	286
Benzoin, tests for	85
Berberine, estimation of, with standard potassium iodide	257
Bismuth, a new reaction for	280
iodides, estimation of iodine in	85
subgallate; its history, chemical composition and properties (<i>Kebler</i>), tests	326 277
Blood, newer observations concerning the detection of, by means of the guaiacum reaction (<i>Schaer</i>)	361
Ehrlich's triple stain for	301
Blue glass, use of, between the source of illumination and the objective	vi
Bone caves of South Devon (<i>Worth</i>)	455
Bread, hygienic methods for handling of	iv
British Pharmaceutical Conference	442
Brown mixture, suggestion of use of glycyrrhizin for	495
Brucine, separate estimation of	18
<i>Bunsen, Robert</i> , memoir of	459
Burette, weight (<i>Peck</i>)	455
Burroughs, Wellcome & Co., excursion of employés of	ii
Cadinene, supposed constituent of oil of sassafras	30
Caffein, comparison of methods for estimation of	xiv
in tea, kola and coffee	xv
Caffeine, quantitative estimation of	145
Calcium ammonium, preparation of	485
Calendula, some new preparations of (<i>Beringer</i>)	268, 302
Calla, specimen of flower of	256
Camphor, cultivation and production of	549
dextro, presence of, in oil of sassafras	30
water, preparation of	163
Cannabinol, formula of	xix
Cannabis indica, recovery from poisoning by	147
Capsule filler, a new form of	557
Caramel, detection of, in spirits and vinegar	xxxvi
Carbon disulphide, commercial (<i>Elborne</i>)	455
Carborundum, manufacture of	294
Cardamoms, note on (<i>Lewton</i>)	152, 172
Cascara sagrada, glucoside of	xxvi
Castor-oil beans, death due to	91
Cevadine, identity with veratrine	132
Chalk powder, compound, addition of oil of cinnamon to	494
<i>Chandler, Charles F.</i> , personal sketch of	457, xxi
Cheiranthin, glucoside present in Cheiranthus cheiri	435
Cheiranthus, constituents of	435
Chicago Veteran Druggists' Association	xxx
Chloroform, lime as a preservative of	485
use of, as a preservative	151
poisoning, treatment for	40
Choline, presence of, in strophanthus	279
Chondrus, some notes on (<i>Kraemer</i>)	357, 479
Cinchona, alkaloidal estimation of	xv
assay process for	312
extraction of, with acetic acid	305
Cinchonas, false, new	397
Cincinnati College of Pharmacy, Alumni Association of	xxx
Cinnamein, determination of, in Peru balsam	230
Citral, presence of, in oil of sassafras leaves	31
Citronellol and geraniol, separation of	304

Cleveland School of Pharmacy	xxi
Cocaine, a new test for (<i>Schaefer</i>)	222
solution of, in cherry laurel water	87
Cocainidine, a new coca base	256
Cocoanuts, specimens of	256
Codeine, estimation of (<i>Maisch</i>)	357
Coffee and tea, inertness of aromatic principles of	42
Cold cream, formula for	495
College of Pharmacy of the City of New York, meetings of	46, 238
Collodion, calendulated, preparation of	269
Collodium, ammoniacal, for insect stings	21
Colocynth, unpeeled, sample of	558
Colophony, investigation of	485
Color of negro children when born, the	ii
Color standards of powdered vegetable drugs	497
Colors of flowers due to microbes	xxxiv
Columbian spirits, extent of replacement of alcohol by, in manufactur- ing by pharmacists (<i>Thomas</i>)	358
<i>Coming Age</i> , the, for August	xxix
Conferva at Neris-les-Bains, the	82
Cork, constituents of	190
Correspondence	456
Coumarin, presence of, in leaves of <i>Liatris odoratissima</i>	103, 133
Cowpox, a work on, by Edward Jenner	605
Creolin, variability in specific gravity of commercial samples	393
Creosote, wood tar (<i>Kebler</i>)	356, 409
Croton oil, differences in the properties of	v
Crystals in paper	i
Curare, alkaloids of	xi
Curarin, origin and properties of	xi
Curarine, location of, in bark of <i>Strychnos</i> species	xi
Curine, principal alkaloid of curare	xi
Damar , tests for	86
<i>Datura alba</i> , flowers of	86
Deer's-tongue leaves, economic uses of	134
Delaware Pharmaceutical Association	298
Delphinium staphisagria (<i>Holmes</i>)	450
Desoxystrychnin, preparation of	xii
Diacetyl-aconitine, physiological action of	286
Diamond, the, genesis of	ii
Digitalis, fat-free, tincture of (<i>England</i>)	332, 357
leaves and seed, active constituents of	190
value of, under varying conditions	145
Digitoxin as the active principle of digitalis (<i>England</i>)	379
presence of, in infusion of digitalis	145
Diphtheria toxin, composition of	232
Disinfection and germs	94
<i>Dohme, A. R. L.</i> Personal	xxix
Doses, introduction of, to the Pharmacopœia	504
reasons for admission of, to the Pharmacopœia	560
Drowning, apparent, treatment for	ii
Drug standards (<i>Moor and Cribb</i>)	455
Drugs and foods, vegetable, valuation of (<i>Kraemer</i>)	498, 529, 584
convenient list of, for ready reference	xxv
powdered, identification of	497
note on (<i>Bamford</i>)	511
suggestions on the examination of	497
Dye, yellow azo, for coloring fats	iii
Ear , the, removal of foreign bodies from	xiv
Eclecticism, some of the principles of	555

Eczema of lips caused by mouth washes and tooth powders	iv
Editorial	41, 94, 147, 191, 234, 288, 346, 399, 437, 487, 549, 599
Eggs, a method for the storage of	xxiv
preservation of	vii
"Eisen emodin," principle obtained from frangula	398
Elder juice in ergot extract	277
Elixir of ammonium valerianate, flavoring for	495
Curaçoa, sample of	301
iron, quinine and strychnine phosphate, preservation of	495
Emetine octoiodide and the extraction and estimation of alkaloids (<i>Gor-</i> <i>din and Prescott</i>)	14
periodides of	516
Emulsification in alkaloidal extractions	III
Emulsifier, phoenix	152
Enzyms, or digestive ferments	548
Ether inhalation	547
Eucalyptus leaves, yellow coloring of	xii
species, new	513
Eugenol, extraction of, from oil of sassafras	29
Euphorbia lathyris, poisonous properties of	xv
Euphorbium, tests for	85
Euphthalmine as a mydriatic	93
Exposition official catalogue	xxix
Fairs and expositions	487
Fats, a new method for determining the melting points of	344
Ferments, digestive, or enzymes	548
Ferrous oxalate as an adulterant of bismuth subgallate	355
Ferrum redactum, B.P., further note upon (<i>Peck</i>)	454
Fig, Italian, specimen of	605
Flaxseed, quality of commercial samples of	393
Flora of Devonshire (<i>Druce</i>)	455
Flour, wheat, microscopic examination of	276
Flowers, dangerous	xxxiv
Fluid extracts, use of, for making other preparations, discussion on	255
Fluoride of potassium and antimony as an adulterant of tartar emetic	355
Foods, artificial; why they exist and what they are (<i>Remington</i>)	357, 383
Formaldehyde, new method for estimating	486
Formalin, possible use of, for preserving pharmaceutical preparations	152
Frangula, constituents of	398
efficacy of glycerite of	399
rhamnetin, principle obtained from frangula	398
Franklin Institute's anniversary	xxv, xxxii
Fruits, value of, in many forms of disease	i
Funnel-holder, a	303
Galbanum, tests for	85
Gamboge, examination of commercial product	394
Gases of the atmosphere, new	294
Gauze, medicated, assay of	83
Gauzes, medicated	282
Gelsemium sempervirens, structure and development of internal phloem in (<i>Thompson</i>)	422
Germs and disinfection	94
Geranial, formula of	34
Geraniol and citronellol, separation of	304
presence of, in oil of sassafras leaves	31
Gilchrist fruit jar, construction of	557
Glass, solder for	xvii
Glucose, diabetic, determination of (<i>Parker</i>)	451
Glycerin, addition of, to percolate rather than menstruum	255
sample of, obtained by analysis of sample of "Husa"	301

Graduate, recent, the	xxx
Graduates, college, in business	ii
Graphite, artificial	294
Guaiacol, estimation of, in creosote	413
Guaiacum reaction for blood (<i>Schaer</i>)	361
Gum-resins, inodorous, constituents of	272
odorous, classification of	272
tests for	85
Gums, resins, etc., classification of (<i>Lewton</i>)	270
true, classification of	270
Gutta-percha, green, from leaves of the caoutchouc tree	v
Hæmocytoza of birds	xiv
Hamamelis bark, constituents of	277
<i>Hammar, Alrik</i> , banquet to	xxx1
Hanbury medal, the, award of, for 1899	xxix
Headache powders, poisoning by	91
<i>Heinitsh, Charles Augustus</i> , memoir of (<i>Redsecker</i>)	78
resolutions on the death of	359
Heliotropine (<i>see</i> piperonal)	28
Hemorrhage, calcium chloride in treatment of	iii
Heroin and heroin hydrochloride, administration of	xxv
<i>Herrera, Alphonso</i> . Personal	xx
<i>Holmes, E. M.</i> Personal	xxix
"Hopein," composition of	xx
Hops, volatile oil of	279
"Husa," an asserted plant preparation to cure the opium habit, and an investigation into (<i>Lloyd</i>)	210, 301
Hyalodendron navalium, a new genus and species of sponge	xxvi
Hybrid pigeon, a, fertility of	xxxiv
Hydrastine, estimation of, with standard iodine	257
hexiodide and assay of <i>Hydrastis Canadensis</i> (<i>Gordin and Prescott</i>)	257
periodides of	517
<i>Hydrastis</i> , assay of	472, 518
assay of fluid extract of	344
the composition of	498
relative value of rhizome and rootlets	86
Hydrogen, action of, on acids	x
peroxide (<i>Tyrer</i>)	451
as a test for salicylic acid (<i>Ridenour</i>)	414
sulphide, a substitute for, in analysis	434
Hyoscin, influence of alkalis upon	284
Hyoscyamin, nature and occurrence of	284
Hyoscyamus, assay of (<i>Puckner</i>)	499
Indigo , artificial	294
Infant mortality and ignorance	xxvii
Influenza, bacillus of	i
Iodoform gauze, assay of	83
Iodometric estimation, comparative merits of	524
Ipecac, acettract of, loss of alkaloid by evaporation of	47
cultivation of, in India	606
<i>Ipecacuanha</i> , assay of	472
assay of the liquid extract and wine of (<i>Naylor and Bryant</i>)	446
assay of the official liquid extract, wine and vinegar of (<i>Farr and Wright</i>)	442
miscible liquid extract of (<i>Bird</i>)	444
Johore (<i>Umney and Swinton</i>)	449
<i>Ipecacuanhæ</i> , extractum, liquidum, assay of (<i>Wilson</i>)	73
I-scopolamin and atrosiin	xiv

Jaborandi, alkaloidal strength of preparations of (<i>Farr and Wright</i>)	449
Jatropha gossypifolia, medicinal properties of	456
Jefferson Medical College, formal opening of the new Medical Hall	xxxiv
Kaolin as a base for a substitute for poultices	478
<i>Robert, Rudolf.</i> Personal	xxxix
Kola, constituents of	84
Kola-red, composition of	84
Küster's method, value of, for testing sodium bicarbonate	38
Laboratory notes (<i>La Wall and Pursel</i>)	358, 392
Language, universal, for men of science	xxx
Lauro tetanin, chemical properties of	483
Lead as an abortifacient	ix
Lemna, red, specimens of	48
Lemon juice, permanent, formula for	xix
Liatris odoratissima, proximate analysis of leaves of (<i>Falkenhainer</i>)	103, 133
Licorice root, Californian, specimens of	256
Life, the right to terminate	xxxiv
Lime as a preservative of chloroform	485
Linalool, presence of, in oil of sassafras leaves	31
Liquor bismuthi et ammonii citratis (<i>Dudderidge</i>)	452
Lithium ammonium, preparation of	485
benzoate and lithium salicylate (<i>Kebler</i>)	48, 57
citrate (<i>Kebler</i>)	103, 137
salicylate, properties of	62
<i>Lloyd, John Uri</i> , a new book by	xxxv
<i>Loew, O.</i> , investigations by	ix
Lozenges, B. P., analytical notes on (<i>Davis</i>)	451
Lubricants for glass stopcocks	i
Lysol poisoning	232
Magnesium citrate, effervescent solution, preparation of	495
effervescing, an adulterant of (<i>Kebler</i>)	545
Manganese in plants	xix
Marine Biological Laboratory, the courses of	xxii
Maryland College of Pharmacy, reception to students and faculty of	xxii
Massage treatment, history of	xiii
Materia medica, notes on (<i>Lowe</i>)	254
Medical druggist, the (<i>Emanuel</i>)	359
Medicine dropper, convenient	152
glass, acme	303
history of, in America	555
Melting-points (<i>Tyrer and Levy</i>)	455
apparatus for determining	345
Merck Pharmacy, the, announcement of	xxv
Metric system, use of	504
use of, in board of pharmacy examinations	504
Microscopic sections, methods for preparation of	viii
Milk, pasteurization of	vii
Millet hay, active principle in	xiv
Minnesota State Pharmaceutical Association	407
<i>Moerk, Frank X.</i> , election of, to chair of analytical chemistry	360
Morphine, cubes of	207
sample of, obtained by analysis of sample of "Husa"	301
Moth-ball, the, as a remedy for mosquito bites	xxxiv
<i>Mueller, Dr.</i> , a memorial to	xxxiv
Mydriatic alkaloids, the, chemistry of (<i>Reber or Pinner</i>)	152
Myrrh, botanical source of	513
tests for	86
Myrticolorin, yellow coloring principle of <i>Eucalyptus makrorhynca</i>	xii

<i>Nagelvoort, J. B.</i> Personal	xxi
National Association of Retail Druggists	507, xxxi, xxxv
Pure Food and Drug Congress	99
Neostyle, use of, for printing by pharmacists	152
Newer remedies, pharmacopoeial requirements for	561
Nicotine, estimation of, in tobacco	145
neutralization of, in tobacco	xix
Nitrates, estimation of, in water	157
in plant tissues	xxxvi
Nomenclature, botanical	288
Nostrum evil, the, management of	505
Notes and news	i, v, ix, xiii, xvii, xxi, xxv, xxix, xxxi
Nux vomica, advantage of standardized preparations of	39
assay of	470
hairs, masses of	558
Obituary — <i>Allen, Grant</i>	606
<i>Buchner, Ludwig</i>	303
<i>Bunsen, Robert</i>	459, xxix
<i>Farr, James M.</i>	408
<i>Frankland, Edward</i>	509
<i>Friedel</i>	303
<i>Greenish, Thomas</i>	605
<i>Heinitsh, Charles A.</i>	78
<i>Hill, Arthur Stephen</i>	304
<i>Jeanjean, Jean-Felix</i>	408
<i>Merck, Wilhelm</i>	207
<i>Parke, Hervey C.</i>	208
<i>Von Waldheim, Anton</i>	510
<i>Schürer</i>	510
Odor as an aid in the recognition of drugs (<i>Lowe</i>)	356, 416
standards, notes on	498
Ohio State Pharmaceutical Association	406
Oil, almond, and other kernel oils (<i>Swinnton and Umney</i>)	453
<i>Aralia nudicaulis</i> , behavior of	372
cade investigation of	282
calendula, preparation of	269
cardamoms (<i>Parry</i>)	453
cod liver, contributions on	238
geranium, acid constituents of	xvi
lemon grass, constituents of	34
linseed, American, constants of	275
olive pits	xix
rose, adulterant of	280
sassafras, chemical properties of	27
examination of commercial samples	397
use of, as a preservative	151
leaves, properties of	31
volatile, of <i>Aralia nudicaulis</i>	374
wheat, analysis of	231
in aquæ, estimation of	xix
Oils, essential, analysis of (<i>Kleber</i>)	554, 566
list of constituents of	581
volatile, classification of	273
lemon and orange, terpeneless, examination of (<i>Idris</i>)	452
Ointment of calendula, preparation of	269
Oleo-resins, classification of	273
Opium assay, processes for	522
Oranges, new hardy edible	xxiii
Organic substances, identification of	500
Paper , glazed, bad for the eyes	xv
waterproof, method of preparation of	ix
Parke, Davis & Co.'s employés, excursion of	xxv
Pasteur monument at Lille, the	xxiii
Pelletier-Caventou memorial, the	ix
Pellotin, new base found in <i>Anhalonium lewinii</i>	413
Pennsylvania Pharmaceutical Association	196, 297, 346, 347

Pennsylvania State Board of Pharmacy, results of examination of	xxi
meeting of	xxxv
Pepper, Mangalore, description of	304
Pepsin testing	501
Personal	457, 508
Pharmaceutical education	399
Pharmacist, the modern (<i>Patton</i>)	359
the, unexplored fields for the occupation of the idle hours of (<i>Stedem</i>),	359
Pharmacognosy, province and applications of (<i>Kraemer</i>)	302
Pharmacology	41
Pharmacological notes	38, 90, 146, 232, 283
Pharmacopœia, U. S., use of, by physicians	88
Pharmacopœias, U. S. and British, the (<i>Lowe</i>)	206, 223
Pharmacopœial Convention, the, time of meeting of	558
preparations from an economical standpoint (<i>La Wall</i>)	48, 64
shorter processes for (<i>Stedem</i>)	162, 204
Pharmacy law, model, framing of	505
recent literature relating to	34, 81, 145, 189, 229, 274, 344, 397, 434
the amusing side of (<i>Redsecker</i>)	483, 546
Phellandrene, recognition of, in oil of sassafras	359
Philadelphia botanists, affiliation of	29
Philadelphia College of Pharmacy:	xxii
Alumni Association	199, 245
Classes of 1898-99	49
Commencement	198, 240
Donation to library	239
Election of officers and trustees	240, 558
Examinations	199, 201, 246
Graduates	240
Minutes of meetings	239, 456, 558
Pharmaceutical meetings	47, 102, 151, 204, 254, 300, 554, 603
Prizes awarded	243, 245
Reports of officers and standing committees	239
Scholarship, endowment of	558
Specimens exhibited and presented, 48, 104, 152, 205, 207, 256, 301, 557, 605	
Philadelphia Exposition, the	xxii
Association of Retail Druggists	150, 197, 298, xxv, xxxv
Phosphorus necrosis, a curious case of	92
Physiological action as a department of pharmaceutical research (<i>Hough-</i> <i>ton</i>)	473, 498
Pills, Bland's, strength of commercial capsules of (<i>Stuart</i>)	454
Pilocarpine—assay of preparations containing it, and the characters of the pilocarpine nitrate and hydrochloride (<i>Jowett</i>)	449
Pilular extracts, incorporation of	495
Pinene, separation of, from oil of sassafras	29
Pinus echinata, analysis of bark of (<i>Koch</i>)	164, 207
Piperazin, injections of	xxxvi
Piperonal, derivation of	28
Plague, propagation of, by rats	iii
Plant analysis, proximate, a common error in recorded results of (<i>Kebler</i>)	25, 104, 144
food, a work on	xxiii
Plants, economical, of East Africa	510
Podophylloresin, active constituent of Indian podophyllum	39
Podophyllotoxin, active constituent of Indian podophyllum	38
Podophyllum, priority in certain investigations of	i
therapeutics of	38
Poison bottle, new	152
Poisoning, curious escape from	xxiv
lead, from the use of soda water	iv

Poisons, immunity to (<i>Thompson</i>)	171
immunity of certain animals to	147
Polonic rays	234
Potassium cyanide, examination of samples of	395
Poultices, a substitute for (<i>Wilbert</i>)	478
Powder measure, acme	303
Powdered drugs, microscopic measurement of, and determination of water in	xxviii
Powders, device for division of	303
estimation of density of	484
Preparations, pharmacopœial, from an economical standpoint (<i>La Wall</i>)	48
<i>Prescott, Albert Benjamin</i> , personal sketch of	508
Prescription files, comparison of	495
Protocuridine, origin and properties of	xii
Protoplasm, structure of	xxviii
Protocarin, origin and properties of	xii
Ptomaine resembling strychnine, a	88
Purshianin, glucoside obtained from cascara sagrada	xxvi
Quinine for hypodermic use	iv
hydrochlorates, preparation of	231
Quebracho, origin and uses of (<i>Lewton</i>)	22
Rattlesnake's fangs, a, abnormal development of	xvii
Rays of energy	234
Reaction, defensive, of the organism	xxxvi
<i>Remington, Jos. P.</i> , degree conferred upon	360
Resin, assay of	85
Resins, tests for	85
true, classification of	271
REVIEWS:	
<i>Allen, Alfred H.</i> Commercial organic analysis	438
<i>Attfield, John.</i> Chemistry; general, medical and pharmaceutical, in- cluding the chemistry of the U. S. Pharmacopœia	236
<i>Bache, Franklin, and George B. Wood.</i> The Dispensatory of the United States	552
<i>Bartley, Elias H.</i> A text-book of medical and pharmaceutical chemistry	43
<i>Bocquillon-Limousin, H.</i> Formulaire des médicaments nouveau pour 1899	347
<i>Boisson, E., et J. Mousmer.</i> Formulaire hypodermique et opothéra- pique	97
<i>Braithwaite, J. Oldham.</i> The pharmaceutical formulary	195
British and Colonial Druggist's Diary, the	44
Chemist and Druggist's Diary, the	45
<i>Chestnut, V. K.</i> Preliminary catalogue of plants poisonous to stock,	601
<i>Coblentz, Virgil.</i> Modern synthetical medicinal products	97
The newer remedies	403
<i>Coming Age</i> , the	195
Contributions from the U. S. National Herbarium	602
<i>Cushny, Arthur R.</i> A text-book of pharmacology and therapeutics, or the action of drugs in health and disease	489
<i>Gaudin, Joseph-Louis.</i> Recherche du coli-bacille dans les eaux et contribution a l'etude de ce microbe	603
<i>Gildemeister, E., und Fr. Hoffmann.</i> Die ätherischen Oele	439
<i>Gould, George M.</i> A pocket medical dictionary	97
<i>Greenish, Henry G.</i> An introduction to the study of materia medica	441
<i>Guguen, Fernand-Pierre.</i> Recherches sur les organismes myceliens des solutions pharmaceutiques	603
<i>Harshberger, John W.</i> The botanists of Philadelphia and their work	441

REVIEWS.— <i>Hérissey, Eugene-Henri.</i> Recherches sur l'emulsine	603
<i>Hersey, Edmund.</i> The basket willow	602
<i>Hoffmann, Fr., und E. Gildemeister.</i> Die ætherischen Oele	439
Index catalogue of the library of the Surgeon-General's office of the U. S. Army	195, 600
<i>Jowett, H. A. D.</i> Assay of preparations containing pilocarpine . . .	601
<i>Lacour, Eymard.</i> Les eaux de Versailles	603
<i>Lenormand, Camille.</i> Nouveaux composés contenant un metal et plusieurs halogènes different	603
<i>Lloyd, C. G.</i> Third report on the Lloyd Mycological Museum . . .	238
<i>Lyons, A. B.</i> Handbook of practical assaying of drugs and galeni- cals	193
<i>Maiden, J. H.</i> The flora of Mount Kosciusko	238
<i>Maisch, John M.</i> A manual of organic materia medica	289
<i>Martindale, William.</i> Drs. Harvey and Davidson's syllabus of materia medica	347
Massachusetts Board of Registration in Pharmacy	195
<i>Merck, E.</i> Annual report on the year 1898	554
Merck's 1899 manual of the materia medica	403
Missouri Botanical Garden, report of	602
<i>Mousmer, J., et E. Boisson.</i> Formulaire hypodermique et opothéra- pique	97
<i>Pammel, L. H.</i> Anatomical characters of the seeds of Leguminosæ, .	602
Physician's visiting list, the	98
Practical methods of urine analysis	404
Proceedings :	
American Pharmaceutical Association, the	98
Kentucky State Pharmaceutical Association	293
Indiana Academy of Science	600
Maryland State Pharmaceutical Association	291
Michigan State Pharmaceutical Association	292
Minnesota State Pharmaceutical Association	292
Missouri State Pharmaceutical Association	293
Pennsylvania State Pharmaceutical Association	45
Vermont State Pharmaceutical Association	292
Virginia State Pharmaceutical Association	293
Wisconsin State Pharmaceutical Association	291
Questions on medical subjects, arranged for self-examination . . .	347
<i>Rice, Charles, and Hans M. Wilder.</i> Digest of criticisms of the United States Pharmacopœia	237
<i>Rockwood, Elbert W.</i> A laboratory manual of physiological chem- istry	553
<i>Rouchy, Charles.</i> Recherches sur la cristallization de l'oxyhemoglo- bine et de hemoglobine	603
<i>Sajous, Charles E. de M.</i> Annual and analytical cyclopædia of prac- tical medicine	236, 402
<i>Saunders, Wm.</i> Experimental farms	238
<i>Schimpf, Henry W.</i> A text-book of volumetric analysis	96
<i>Schleif, William.</i> Schleif's materia medica	490
<i>Schryver, S. B.</i> A new method for the analysis of commercial phenols	602
Preparation of acid phenylic salts of dibasic acids	601
<i>Seabury, George J.</i> Shall pharmacists become tradesmen?	601
Semi-annual report of Schimmel & Co.	45
<i>Stoney, Emily A. M.</i> Practical materia medica for nurses	404
<i>Thoms, H.</i> Einführung in die praktische Nahrungsmittelchemie . .	401
<i>Thornton, E. G.</i> The Medical News pocket formulary	237
<i>Thorp, Frank Hall.</i> Outlines of industrial chemistry, a text-book for students	149
<i>Villada, Manuel M.</i> La Naturaleza	238

REVIEWS.— <i>Wilcox, Reynold W.</i> Materia medica, pharmacy, pharmacology and therapeutics	490
<i>Wilder, Hans M., and Charles Rice.</i> Digest of criticisms of the United States Pharmacopœia	237
<i>Wood, George B., and Franklin Bache.</i> The Dispensatory of the United States	552
Year-book of Pharmacy	45
Rheumatism, caused by habitual use of tea	xxvii
Rhubarb, constituents of	398
Rhus aromatica as a remedy for enuresis in children	xxiv
Rubber, natural and artificial	191
substitutes, natural (<i>Holmes</i>)	450
Saffron, resin in stigmas of	48
samples of	48
Safrol, chemical properties of	28
Sanarelli's yellow fever serum, orders for	iv
Santonin, reaction for	81
Saps and extracts, inspissated	274
milky, classification of	274
Sarsaparilla, adulterant of	xii
Sassafras, chemistry of (<i>Kleber</i>)	27, 46
differentiation of stem bark and root bark	46
Scopola as an equivalent of belladonna (<i>Williams</i>)	499
introduction of, to the U.S.P. (<i>Rusby</i>)	499
Scopolamin, identity with hyoscin	284
Scopolamine and atrosine, comparative experiments with	39
Seasickness, specific against	xxiv
Secalis cornuti, adulteration of extract of	x
Self-destruction, Japanese method of	iii
Senecio aureus as a hæmostatic	xii
Senega, assay of	x
constituents of	86
Senna, constituents of	398
Sesquiterpenes, addition products of oxides of nitrogen to	496
Silk, artificial	295
<i>Smith, Edgar F.</i> Personal	xxi
Soap liniment, preferable formula for	494
Sodium bicarbonate, liberation of CO ₂ from, by heat (<i>Dyer</i>)	450
testing of	37
chloride, presence of, in Yerba reuma (<i>Kebler</i>)	23
electrolytic	295
oxalate as a base for standardizing solutions for acidimetry and alkali-	
metry	436
peroxide, properties of	295
phosphate, neutral	548
salicylate, test for	414
Solanine, detection of excess of, in potatoes	280
in potatoes	548
Solanum species, Chilean	146
Somatose preparations, administration of	x
Specific gravity, note on (<i>Wiegand</i>)	26, 48
Spirit of nitrous ether, preparation of	500
Spiritus camphoræ, assay of	82
Spirituos liquors, discussion for and against their retention in the Pharmacopœia	496
Standardization, scope and meaning of	562
Staphisagroin, new alkaloid of stavesacre	413
Starch as an adulterant of Japan wax	205
comparison of standard methods for the estimation of	v
grains, study of (<i>Kraemer</i>)	174

Starch, rice, detection of, in wheat flour	276
rye, detection of, in wheat flour	276
yam, as an adulterant of mustard	558
Stavesacre, new alkaloid in	413
Stop-cocks, glass, lubricants for	1
Storax, tests for	86
Street-cleaning, waste of sweepings in	ix
Strontium bromide in epilepsy	232
Strophanthidin, formula of	279
Strophanthin, presence of, in oleander	281
Strophanthus, constituents of	279
Strychnidin, properties of	xii
Strychnin compounds, new	xii
Strychnine, separate estimation of	18
Strychnolin, preparation of	xii
Substitution, a legal decision on	xxxv
Sulphur in California, discovery of	xxiv
Sumac, poison	xxxiii
Sumach, Sicilian, adulteration of	x
Sunstroke, due to bacteria	vi
electric	xiii
Suprarenal extract, effects of	92
Syrup of balsam of tolu (<i>Farr and Wright</i>)	454
hydriodic acid (<i>Haussmann</i>)	102, 121
hydriodic acid (<i>Wells</i>)	254
tolu, formula for	495
wild cherry, method of dissolving sugar for	495
Syrups of acacia and althæa (<i>Haussmann</i>)	151
Syrupus acaciæ (<i>Haussmann</i>)	156
althææ, preparation of (<i>Haussmann</i>)	153
Pruni virginianæ (acetous) (<i>Remington</i>)	209, 255
rhei (<i>Haussmann</i>)	255, 267
Tablet triturates, demand for (<i>Thomas</i>)	358
Tannin of <i>Pinus echinata</i> , analysis of	170
Taraxacum, doubtful presence of alkaloid in	500
Tea and coffee, inertness of aromatic principles of	42
Telegraphy, wireless	295
Telepathy, mental	xiii
Temperature, influence of, in determining specific gravity and other con- stants	48
Terebene, B.P. (<i>Ough</i>)	452
Tetra-hydro-strychnin, properties of	xii
Theobromine, identification of	36
quantitative estimation of	145
Thoracic rays	234
Thyroid extract, action of	146
Tinctura opii deodorata cum camphoræ (<i>Wiegand</i>)	256, 300
Tincture of asafetida, preparation of	162
calumba, preparation of	162
gentian, prevention of precipitation of	494
guaiac, preparation of	162
ammoniated, preparation of	162
iodine, method for	204
preparation of	163
myrrh, preparation of	163
Tobacco, effect of, upon the development of the young	v
Tolu, tests for	85
Toxicological examinations for alkaloids	87
Trade-mark and patent laws, revision of	354
Trigonelline, presence of, in strophanthus	279

<i>Trimble, Henry</i> , resolutions on the death of	359
"Tsofar" tree, the, sounds given off by	v
Tulocurarin, derivative of curine	xii
Turpentine, examination of samples of	396
tests for	86, xxvii
Typhoid fever, sanitation in regard to	xviii
Tyrosin, presence of, in bean pods	282
United States Pharmacopœia, convention for the revision of	295
Uranic rays	234
Urine, Ehrlich's diazo-reaction for	93
Urotropin as a urinary disinfectant	93
Vacation and summer work	437
Vaccination, a conclusive proof of the efficacy of	xviii
Vanilla plant, odorous character of	133
Vanillin, adulterants of	355
characteristic reaction for	xxvi
volumetric estimation of	190
Vasogen, properties of	xx
Veratrine, commercial, analysis of (<i>Frankforter and Pease</i>)	130
Veratrum album and V. viride, therapeutic action of	vi
Vinegar, cider, acidity of	104
commercial, analysis of (<i>Ryan</i>)	71, 104
<i>Warner, Wm. R., & Co.</i> , destruction of laboratories of, by fire	ix
Warner's pocket medical dictionary	xxix
Water, distilled, and its uses	300
estimation of nitrates and ammonia in (<i>Moerk</i>)	157, 207
pure, poisonous character of	36
Waters, aromatic, estimation of	35
medicated, preparation of	205
Wax, Japan, in the official ointments and cerates (<i>Pursel</i>)	205, 217
yellow, extent of adulteration of	396
Wild cherry bark, deterioration of	497
Wood pulp sheets, use of, in poultices (<i>Gordon</i>)	525, 557
Wood, very old, specimen of	256
<i>Woolton, A. C.</i> , retirement of, as editor of the <i>Chemist and Druggist</i>	xxv
Yerba reuma, proximate analysis of, and presence of sodium chloride in fluid extract of (<i>Kebler</i>)	23

AUTHORS.

<i>Adrian and Trillat</i> . Reaction of phosphoric acid on glycerin	iii
<i>Aherson, J. H.</i> Malic acid of the crassulaceæ	278
<i>Ahrens, F. B.</i> New alkaloid in stavesacre	413
<i>Alpers, William C.</i> The oil and terpenes of <i>Aralia nudicaulis</i>	370
Notes on odor standards	498
<i>Aweng</i> . Constituents of frangula, rhubarb and senna	398
<i>Baker, R. T.</i> New eucalyptus species	513
<i>Bamford, M. W.</i> Note on powdered drugs	511
<i>Barth, H.</i> Decolorizing reddened carbolic water	280
<i>Bartley, E. H.</i> Identification of organic substances	500
<i>Beckurts and Fievrichs</i> . Estimation of volatile oil in aromatic waters	xix
<i>Bell, Samuel</i> . Thyroid extract	146
<i>Berdrick, George H., and L. E. Sayre</i> . Pepsin testing	501
<i>Beringer, George M.</i> Some new preparations of calendula	268, 302
<i>Berthelot</i> . Action of hydrogen on acids	x
Nitrates in plants	xxxvi

<i>Bird, F. C. J.</i> Miscible liquid extract of ipecacuanha	444
<i>Bizzozzero.</i> Proof of the efficacy of vaccination	xviii
<i>Blank, O., and H. Finkenbeiner.</i> Estimation of formaldehyde	486
<i>Boehm, R.</i> Alkaloids of curare	10
<i>Borntraeger.</i> Determination of tartaric acid in presence of citric acid	xiv
<i>Bourquelot and Hérissé.</i> Cause of blackening of bean pods	281
<i>Brunner.</i> Neutral sodium phosphate	548
<i>and Morpurgo.</i> Estimation of arsenic in tea	xiii
<i>Bryant, John J., and W. A. H. Naylor.</i> Assay of the liquid extract and wine of ipecacuanha	446
Uganda aloes	510
<i>Candussio.</i> Solution of aluminum acetate	230
<i>Carles, M. P.</i> The conferva at Neris-Les-Bains	82
<i>Cartier.</i> Therapeutic action of Veratrum album and V. viride	vi
<i>Cash, J. T., and W. R. Dunstan.</i> Pharmacology of aconitine	286
<i>Cepellini.</i> Elder juice in ergot extract	277
<i>Cepellini, Italo.</i> Adulteration of extract of Secalis cornuti	x
<i>Chapman, A. C.</i> Volatile oil of hops	279
<i>Cloetta, M.</i> Active constituents of digitalis leaves and seed	190
<i>Collin, E.</i> Microscopic examination of wheat flour	276
<i>Cramer, Heinrich.</i> Lysol poisoning	232
<i>Crampton, C. A., and F. D. Simons.</i> Detection of caramel in spirits and vinegar	xxxvi
<i>Cribb, C. H., and C. G. Moor.</i> Drug standards	455
<i>Crossley, A. W., and H. R. LeSueur.</i> A new method for the determina- tion of the melting points of fats	344
<i>Dabney, T. S.</i> Physiological action of Apocynum cannabinum	90
<i>Davis, Frederick.</i> Analytical notes on the B.P. lozenges	451
<i>DeKieffer, Otto.</i> Distilled water and its uses	300
<i>DeNegri, G.</i> Wheat oil	231
<i>Deniges.</i> Detection of citric acid	275
<i>Derby, Orville A.</i> Evidence on the genesis of the diamond	ii
<i>Dieterich, K.</i> Tests for gum resins, resins and balsams	85
<i>Dietz.</i> A new adulterant of oil of rose	280
<i>Dixon, Walter E., and Hector W. G. Mackenzie.</i> Therapeutics of podo- phyllum	38
<i>Dohme, A. R. L., and Hermann Engelhardt.</i> The composition of hydras- tis	498
The glucoside of cascara sagrada	xxvi
<i>Dollken, A.</i> Imbedded tissues without use of alcohol	viii
<i>Dowzard, Edwin.</i> Composition of commercial araroba	453
<i>Druce, G. C.</i> The flora of Devonshire	455
<i>Dubigadoux and Durieu.</i> Strophanthin in oleander	281
<i>Dudderidge, Frank R.</i> Liquor bismuthi et ammonii citratis	452
<i>Dudley, C. B., and F. N. Pease.</i> Testing spirits of turpentine	xxvii
<i>Dunstan, W. R., and J. T. Cash.</i> Pharmacology of aconitine	286
<i>Durieu and Dubigadoux.</i> Strophanthin in oleander	281
<i>Dyer, C. S.</i> Liberation of CO ₂ from sodium bicarbonate by heat	450
<i>Eccles, R. G.</i> How can we manage the nostrum evil?	505
<i>Ehrlich, P.</i> Composition of diphtheria toxin	232
<i>Ekroos, H.</i> Alkaloidal determination of cinchona	xv
<i>Elborne, W.</i> Commercial carbon disulphide	455
<i>Emanuel, Louis.</i> The medical druggist	359
<i>Engelhardt, Hermann, and A. R. L. Dohme.</i> The composition of hydras- tis	498
The glucoside of cascara sagrada	xxvi
<i>England, Joseph W.</i> On digitoxin as the active principle of digitalis	379
Tincture of fat-free digitalis	332, 357

<i>Eschenburg</i> . Assay of spiritus camphoræ	82
<i>Ewers, E.</i> Aromatic waters	35
<i>Falkenhainer, Charles</i> . Proximate analysis of the leaves of <i>Liatris odoratissima</i>	103, 133
<i>Farr, E. H., and R. Wright</i> . Alkaloidal strength of preparations of jab-orandi	449
Assay of the official liquid extract, wine and vinegar of ipecacuanha	442
Syrup of balsam of tolu	454
<i>Feil, Joseph</i> . Spirit of nitrous ether	500
<i>Feist, F.</i> Analysis of strophanthin	279
<i>Feldmann and Troeger</i> . Oil of cade	282
<i>Fierichs and Beckurts</i> . Estimation of volatile oil in aromatic waters	xix
<i>Filippo, J. D.</i> Investigation of lauro tetanin	483
<i>Finkenbeiner, H., and O. Blank</i> . Estimation of formaldehyde	486
<i>Fischer, Richard</i> . Absence of hydrocyanic acid in <i>Mitchella repens</i>	81
<i>Flatau and Labbé</i> . Geranium oil	xvi
<i>Flatau, J., and H. Labbé</i> . Separation of geraniol and citronellol	304
<i>Francois, M.</i> Identification of theobromine	36
<i>Frankforter, George B., and Levi B. Pease</i> . The analysis of commercial veratrine	130
<i>Freire Domingos</i> . Dangerous flowers	xxxiv
<i>Fromme</i> . Test for limed althæa	189
<i>Gadamer, T.</i> Atroscin and i-scopolamin	xv
<i>Gadamer, J.</i> Caffein in tea, kola and coffee	xv
<i>Geisler, J. F.</i> Yellow azo dye for coloring fats	iii
<i>Gerald</i> . Neutralizing nicotine in tobacco	xix
<i>Gill, A. H., and A. C. Lamb</i> . Constants of American linseed oil	275
<i>Glücksman, C.</i> Cocaine and cherry laurel water	87
<i>Goldmann</i> . Therapeutics of heroin and heroin hydrochloride	xxv
<i>Gomberg, M., and A. van Zwaluwenburg</i> . Does taraxacum contain an alkaloid?	500
<i>Gomer</i> . Alcohol as a disinfectant	vi
<i>Gordin, H. M., and A. B. Prescott</i> . Emetine octoiodide and the estimation of alkaloids	14
Estimation of alkaloids and the assay of alkaloidal drugs	498, 514
Directions for certain alkaloidal assays	462, 498
Hydrastine hexiodide, and assay of <i>Hydrastis canadensis</i>	257
<i>Gordon, F. T.</i> Use of wood-pulp sheets in poultices	525, 557
<i>Greenleaf, Robert W.</i> Poisoning by headache powders	91
<i>Grüttner, F.</i> The constituents of hamamelis bark	277
<i>Gundrum</i> . <i>Senecio aureus</i> as a hæmostatic	xii
<i>Hanausek, T. F.</i> Description of Mangalore pepper	304
<i>Hare</i> . Calcium chloride in hemorrhage	iii
<i>Harte, Richard H.</i> Hara-kiri	iii
<i>Hartwich, C.</i> New false cinchonas	397
<i>Hartwich</i> . Adulterant of sarsaparilla	xii
<i>Hausmann, F. W.</i> Syrup of hydriodic acid	102, 121
Syrups of acacia and althæa	151
Syrupus acaciæ	156
Syrupus althææ	153
Syrupus rhei	255, 267
<i>Hébert, A.</i> Hydrocyanic acid in plants	iii
<i>Hefelmann, R.</i> Estimation of nicotine in tobacco	145
<i>Henderson, H. J.</i> Assay of belladonna plasters	454
<i>Hérissay and Bourquelot</i> . Cause of blackening of bean-pods	281
<i>Hesse</i> . The flowers of <i>datura alba</i>	86
<i>Hockauf</i> . Percentage of ash in various drugs	82
<i>Holleman, A.</i> Separation of the tartaric acids	189

- Holmes, E. M.* Delphinium staphisagria 450
Hooper, David. Three natural rubber substitutes 450
Houghton, E. M. Physiological action as a department of pharmaceutical research 473, 498
Hummel. Foreign bodies in the ear xiv
- Idris, T. H. Williams.* Examination of the terpeneless oils of lemon and orange 452
- James, Martha M., and Edward Kremers.* Assay of senega x
Jamieson. Lead poisoning from the use of soda water iv
Janet, C. Formic acid of ants xxvi
Javillier, M. Differences in croton oil prepared by different methods v
Jorissen, W. P. Stability of oxalic acid solutions 486
Jowett, H. A. D. Assay of preparations containing pilocarpine and characters of the pilocarpine nitrate and hydrochloride 449
- Kain, Jos.* Constituents of senega 86
Kander, E. Alkaloids of Anhalonium lewinii 413
Kebler, Lyman F. Bismuth subgallate; its history, chemical composition and properties 326
Common error in recorded results of plant analysis 25, 104, 144
Lithium benzoate and lithium salicylate 48, 57
Lithium citrate 103, 137
Magnesium citrate, adulterated with magnesium sulphate 545
Presence of sodium chloride in Yerba reuma, and analysis of the plant 23
Wood-tar creosote 356, 409
- Kennert, E.* Constituents of cork 190
Kleber, Clemens. The analysis of essential oils 554, 566
The chemistry of sassafras 27, 46
Klein. Oil of olive pits xix
Koch, Christopher, Jr. Analysis of bark of Pinus echinata 164, 207
Koeppe, H. Poisonous character of pure water 36
Kolipinski. Recovery from a large dose of hydrocyanic acid 39
Kraemer, Henry. Color standards of powdered vegetable drugs 497
Some notes on chondrus 357, 479
Study of starch grains 174
Valuation of vegetable drugs and foods 498, 529, 584
What is pharmacognosy? 302
- Kremers, Edward, and Martha M. James.* Assay of senega x
and *O. Schreiner.* Addition products of oxides of nitrogen to sesquiterpenes 496
Krokiewics. Ehrlich's diazo-reaction in urine 93
Krug, W. H., and H. W. Wiley. Comparison of standard methods for the estimation of starch v
Kunz, W. Quantitative estimation of caffeine and theobromine 145
- Labbé and Flatau.* Geranium oil xvi
Labbé, H., and J. Flatau. Separation of geraniol and citronellol 304
Ladd, E. F. An active principle in millet hay xiv
Comparison of methods for estimating caffeine xiv
Lamb, A. C., and A. H. Gill. Constants of American linseed oil 275
Lambert and Noel. Anemonin xvi
Lavraud. Electrical sunstroke xiii
La Wall, Chas. H. Pharmacopœial preparations from an economical standpoint 48, 64
and *Robert C. Pursel.* Laboratory notes 358, 392
Leech, D. J. Dosage of belladonna and nux vomica 39
Leffmann, H. Digestive ferments or enzymes 548

<i>Le Sueur, H. R., and A. W. Crossley.</i> A new method for the determination of the melting points of fats	344
<i>Levy, A., and T. Tyrer.</i> Melting points	455
<i>Leulton, Frederick L.</i> Classification of gums, resins and similar substances, 270	
Note on cardamoms	152, 172
Quebracho	22
<i>Lloyd, John Uri.</i> An investigation into "Husa," etc.	210, 301
History of medicine in America	555
<i>Lowe, Clement B.</i> Odor as an aid in the recognition of drugs	356, 416
Notes on materia medica	254
The United States and British pharmacopœias	206, 223
<i>Mackenzie, Hector W. G., and Walter E. Dixon.</i> Therapeutics of podophyllum	38
<i>Maisch, Henry C. C.</i> Estimation of codeine	357
<i>Marshall, Arthur.</i> Preparation of standard solutions of sulphuric acid .	484
<i>Marshall, C. E.</i> Pasteurization of milk	vii
<i>Marshall, D. T.</i> Chloroform poisoning	40
<i>Mason, Harry B.</i> Introduction of doses to the Pharmacopœia	504
<i>Mecke and Wimmer.</i> A ptomaine resembling strychnine	88
<i>Meyer, G.</i> Solanine in potatoes	548
<i>Meyer, Otto.</i> Scopolamine and atrosine	39
<i>Mjoen, J. A.</i> Toxicological examinations for alkaloids	87
<i>Moerk, Frank X.</i> Assay of belladonna leaves	320, 356
Estimation of nitrates and ammonia in water	157, 207
Assay of belladonna leaves and some of its preparations	105, 151
<i>Moissan, H.</i> Lithium ammonium and calcium ammonium	485
<i>Moor, C. G., and C. H. Cribb.</i> Drug standards	455
<i>Moore, J. Percy.</i> Hyalodendron navalium	xxvi
<i>Morpurgo and Brunner.</i> Estimation of arsenic in tea	xiii
<i>Naylor, W. A. H., and John J. Bryant.</i> Assay of the liquid extract and wine of ipecacuanha	446
Uganda aloes	510
<i>Newman, D., and Ramsay.</i> Lime as a preservative of chloroform . .	485
<i>Noel and Lambert.</i> Anemonin	xvi
<i>Oesterle, O. A.</i> A study of aloin	546
<i>Opie.</i> Hæmocytoza of birds	xiv
<i>Osler.</i> Typhoid fever	xviii
<i>Ough, Lewis.</i> Terebene, B.P.	452
<i>Parker, R. H.</i> The determination of diabetic glucose	451
<i>Parry, E. J.</i> Oil of cardamoms	453
<i>Patton, John F.</i> The modern pharmacist	359
<i>Pease, F. N., and C. B. Dudley.</i> Testing spirits of turpentine	xxvii
<i>Pease, Levi B., and Geo. B. Frankforter.</i> The analysis of commercial veratrine	130
<i>Peck, E. Saville.</i> Further note upon ferrum redactum B.P.	454
Weight burette	455
<i>Perkin, R. G., and P. J. Wood.</i> Adulteration of Sicilian sumach . . .	x
<i>Pfuhl, E.</i> Bacteria in ground water	vii
<i>Phillips, F. C.</i> Lubricants for glass stop-cocks	i
<i>Pinner, A.</i> The mydriatic alkaloids	152, 283
<i>Pollacci.</i> A new bismuth reaction	280
<i>Power, F. B.</i> Priority in certain investigations of podophyllum . . .	i
<i>Prescott, A. B., and H. M. Gordin.</i> Emetine octoiodide and the estimation of alkaloids	14
Estimation of alkaloids and the assay of alkaloidal drugs . . .	498, 514
Direction for certain alkaloidal assays	462, 498
Hydrastine hexiodide and assay of <i>Hydrastis canadensis</i>	257

<i>Puckner, W. A.</i> Assay of hyoscyamus	499
<i>Pursel, Robert C.</i> Japan wax in the official ointments and cerates	205, 217
and <i>Charles H. LaWall.</i> Laboratory notes	358, 392
<i>Ramsay and D. Newman.</i> Lime as a preservative of chloroform	485
<i>Rappin, M.</i> Bacillus of influenza	i
<i>Reber, Wendell.</i> Chemistry of the mydriatic alkaloids	152, 283
<i>Redsecker, J. H.</i> Memoir of Charles Augustus Heinitsh	78
The amusing side of pharmacy	359
<i>Redwood, Iltyd J.</i> Action of an acetylene gas flame on platinum	274
<i>Reeb, M.</i> Constituents of cheiranthus	435
<i>Remington, J. Percy.</i> Artificial foods; why they exist and what they are	357, 383
<i>Remington, Joseph P.</i> Syrupus Pruni virginianæ (acetous)	209, 255
<i>Rice, Charles.</i> Some pharmacopœial problems	559, 603
<i>Richard, P.</i> Manganese in plants	xix
<i>Ridenour, W. E.</i> Hydrogen peroxide as a test for salicylic acid	414
<i>Roche.</i> Strontium bromide in epilepsy	232
<i>Rusby, H. H.</i> Introduction of scopola to the U.S.P.	499
<i>Rushmore.</i> Ether inhalation	547
<i>Rusting, N.</i> Assay of fluid extract of hydrastis	344
<i>Ryan, Frank G.</i> Analysis of commercial vinegar	71, 104
<i>Samson, Lugin.</i> Sunstroke due to bacteria	vi
<i>Saxby.</i> Recovery from poisoning by Cannabis indica	147
<i>Sayre, L. E., and George H. Berdrick.</i> Pepsin testing	501
<i>Schacherl, G.</i> Assay of medicated gauze	83
<i>Schaefer, George L.</i> A new test for cocaine	222
<i>Schaer, Edward.</i> Newer observations concerning the detection of blood by means of the guaiacum reaction	361
<i>Schick, R.</i> Investigation of colophony	485
<i>Schlotterbeck, J. O., and A. van Zwaluwenburg.</i> Structure and develop- ment of seeds	497
<i>Schmidt.</i> Examination of hydrastis	86
<i>Schneider, Albert.</i> Identification of powdered drugs	497
Suggestions on the examination of drugs	497
<i>Schnell.</i> Detection of excess of solanine in potatoes	280
<i>Schreiner, O., and Edward Kremers.</i> Addition products of oxides of nitro- rogen to sesquiterpenes	496
<i>Schweitzer, C.</i> The constituents of kola	84
<i>Scoville, W. L.</i> Examinations	505
<i>Simons, F. D., and C. A. Crampton.</i> Detection of caramel in spirits and vinegar	xxxvi
<i>Skubich.</i> Testing sodium bicarbonate	37
<i>Smith, Carl E.</i> The pharmacopœial standard for belladonna plaster	32
<i>Smith, H. G.</i> Yellow coloring of eucalyptus leaves	xii
<i>Soulier.</i> Defensive reaction of the organism	xxxvi
<i>Spindler, O.</i> Assay of iodine in the iodides of bismuth	85
Bismuth tests	278
<i>Spirey, W. T. W., and T. B. Wood.</i> Cannabinol	xix
<i>Squibb, Edward R.</i> Acetic acid as a substitute for ethyl alcohol in the extraction of drugs	I, 305
<i>Stedem, F. W. E.</i> Unexplored fields for the idle hours of the pharmacist, 359 Some shorter processes for pharmacopœial preparations	162, 204
<i>Sternberge, L.</i> Anison, the new anesthetic	233
<i>Stevens, A. B.</i> Deterioration of wild cherry bark	497
<i>Stiehl, W.</i> Constituents of oil of lemon grass	34
<i>Strohmeyer, O.</i> Algal flora of the Hamburg water works	xxvi
<i>Stuart, C. E.</i> Strength of commercial capsules of Bland's pills	454
<i>Swinton, Ralph S., and John C. Umney.</i> Almond and other kernel oils	453
Johore ipecacuanha	449

<i>Tapel.</i> New strychnin compounds	xii
<i>Thierot, J. H.</i> Preservation of eggs	vii
<i>Thomas, D. J.</i> How far can Columbian spirits replace alcohol in manufacturing by pharmacists?	358
Is the demand for tablet triturates on the decline?	358
<i>Thompson, Caroline B.</i> The structure and development of internal phloem in <i>Gelsemium sempervirens</i>	422
<i>Thompson, Wm. B.</i> Fluid acettracts in comparison with fluid extracts	47, 67
Further observations on acetic acid extracts	205
Immunity to poisons	171
<i>Thoms, H.</i> Constituents of <i>strophanthus</i>	279
Bismuth tests	277
Peru balsam	229
<i>Trentler.</i> Euphthalmine as a mydriatic	93
<i>Trillat and Adrian.</i> Reaction of phosphoric acid on glycerin	111
<i>Troeger and Feldmann.</i> Oil of cade	282
<i>Trowbridge.</i> Upper regions of the air	ix
<i>Turinski.</i> Medicated gauzes	282
<i>Tyrer, Chas. T.</i> Hydrogen peroxide	451
<i>Tyrer, T., and A. Levy.</i> Melting points	455
<i>Umney, John C., and Ralph S. Swinton.</i> Almond and other kernel oils	453
Johore ipecacuanha	449
<i>Vandevyver, L. N.</i> Apparatus for determining melting points	345
<i>Vandevyver, M.</i> Estimation of density of powders	484
<i>Van Son, A. F. P.</i> Alkaloid of lettuce	xvi
<i>Van Zwaluwenburg, A., and J. O. Schlötterbeck.</i> Structure and development of seeds	497
and <i>M. Gombert.</i> Does taraxacum contain an alkaloid?	500
<i>Vitali, D.</i> Preparation of the hydrochlorates of quinine	231
<i>Vogtherr, M.</i> A substitute for hydrogen sulphide in analysis	434
<i>Von Cyon.</i> Effects of suprarenal extract	92
<i>Welmans.</i> Reaction for vanillin	xxvi
Volumetric estimation of vanillin	190
<i>Weisser.</i> Mouth washes and tooth powders as a cause of eczema of the lips	iv
<i>Wells, Edwin H.</i> Syrup of hydriodic acid	254
<i>Whelpley, H. M.</i> Metric system in board of pharmacy examinations	504
Use of the metric system	504
<i>Whitney, Henry M.</i> Framing of a model pharmacy law	505
<i>Wiegand, Thos. S.</i> Note on specific gravity	26, 48
Tinctura opii deodorata cum camphoræ	256, 300
<i>Wijsman-Leyden.</i> Localization of alkaloids	173
<i>Wilbert, M. I.</i> A substitute for poultices	478
<i>Wilcox.</i> Use of urotropin as a urinary disinfectant	93
<i>Wiley, H. W., and W. H. Krug.</i> Comparison of standard methods for the estimation of starch	v
<i>Williams, S. W.</i> Scopola as an equivalent of belladonna	499
<i>Wilson, Harold.</i> Assay of extractum ipecacuanhæ liquidum	73
<i>Wimmer and Mecke.</i> A ptomaine resembling strychnine	88
<i>Wood, P. J., and R. G. Perkin.</i> Adulteration of Sicilian sumach	x
<i>Wood, T. B., and W. T. W. Spirey.</i> Cannabinol	xix
<i>Worth, R. Hansford.</i> Bone caves of South Devon	455
<i>Wright, R., and E. H. Farr.</i> Alkaloidal strength of preparations of jaborandi	449
Assay of the official liquid extract, wine and vinegar of ipecacuanha	442
Syrup of balsam of tolu	454

NOTES AND NEWS.

PRIORITY IN CERTAIN INVESTIGATIONS OF PODOPHYLLUM.—F. B. Power, in the issue of the *Chemical News* for July 15, 1898, calls attention to some erroneous statements made by Messrs. Dunstan and Henry in a paper entitled, "A Chemical Investigation of the Constituents of Indian and American Podophyllum," and which was published in the *Journal of the Chemical Society*, April, 1898, pp. 209-226. The writer shows that, instead of Podwysotski being the first to prove the absence of berberine in podophyllum, as would be inferred from the paper referred to, that he (Professor Power) was the first to prove the absence of berberine or any alkaloid in podophyllum, by citing a number of authorities. The writer also claims priority in reference to the observations on the action of fused potash on podophyllin and the statement that volatile acids were formed.

INFLUENZA.—M. Rappin (*Le Progrès Médical*, August 20th) reports on the various epidemics of "la grippe" that he has studied for many years past in Nantes and in the neighboring districts. In the many different cases that he examined from a bacteriological point of view, he succeeded in isolating one form of bacillus, which seems to him to be the pathogenic agent of the disease. —*The Sanitarian*, October, 1898.

THE VALUE OF FRUITS.—According to *Modern Medicine* fruits are of great value in many forms of disease, on account of the acids which they contain. These acids, when taken into the blood, break up some of the compounds of waste substances which have been formed, and thus give rise to an increased excretion of these substances through the kidneys. In this way fruits are a great advantage in the treatment of rheumatism, gout, gravel and all the different morbid conditions which accompany the so-called uric acid diathesis, including neurasthenia. Obesity may also be successfully treated by a fruit dietary. In fevers, fruits furnish a most appropriate food, particularly in the form of fruit juices.—*Scientific American*, Vol. LXXVIII, No. 23.

LUBRICANTS FOR GLASS STOPCOCKS.—F. C. Phillips (*Jour. Am. Chem. Soc.*) gives the following formula:

Pure rubber	70 parts.
Spermaceti	25 "
Vaseline	5 "

On mixing these together, a mass is obtained which lubricates well, is translucent, adheres to the glass and is not saponifiable. The materials should be thoroughly mixed while hot, the rubber being melted first and the others stirred in. A little more vaseline is required in winter than in summer.

A still better preparation has the following formula:

Pure rubber	70 parts.
Yellow unbleached beeswax	30 "

The rubber is best heated in a covered vessel until thoroughly melted, then adding the wax. The hot mixture should be well stirred.—*Am. Gas-Light Jour.*, October 3, 1898, p. 494.

CRYSTALS IN PAPER.—It has been discovered that old paper, such as is found in old books, sometimes contains beautiful dendritic crystals. It is supposed

that particles of brass or copper have fallen on the paper pulp and have been partly dissolved in the chemicals. The lapse of years permits crystallization. Twenty years is supposed to be required, as also a certain amount of dampness in the paper. The star-like cluster has a width of about 1 millimetre, and may be examined with a small lense or a low-power objective. Dr. Shanks has recently found three of these forms upon linen paper, whose age was not known. Thick and rather soft papers are most likely to contain them.—*The Am. Month. Microsc. Jour.*, October, 1898.

ANNUAL EXCURSION AND DINNER.—The employés of Burroughs, Wellcome & Co., of London, spent a day recently in an excursion to Dover. The Town Hall, where the dinner was given, had been placed at the disposal of the firm by the local authorities. Suitable toasts were proposed and responded to by the members of the firm, employés and press and visitors. Mr. Wellcome stated, among other things in his toast to the employés, that the firm always endeavored to encourage technical education and general development of the minds of those associated with them, and when adding to their staff they tried to secure the services of the very best men.

COLLEGE GRADUATES IN BUSINESS.—Professor Schwab, of Yale, says that the learned professions absorb 62 per cent. of the college graduates nowadays, whereas they formerly absorbed 92 per cent. On the other hand, business pursuits now take 31 per cent., against 6 per cent. in the old days.

THE COLOR OF NEGRO CHILDREN WHEN BORN.—An eminent French physician having had opportunity of making observations bearing on this subject, reports that the negro baby comes into the world a tender pink color; the second day it is lilac; ten days afterward it is the color of tanned leather, and at fifteen days it is chocolate. The coloring matter in the case of the negro lies between the layers of the epidermis. The pigment is semi-fluid, or in the form of fine granulations; in the Indian it is red, and in the Mongolian yellow. It is influenced not only by sun and by climate, but by certain maladies and the negro changes in tint just as the white person does.—*Pediatrics*, Vol. VI, p. 40.

TRACTION ON THE TONGUE IN APPARENT DROWNING.—A report was recently published in *La Tribune Medicale*, which appears to illustrate the value of traction of the tongue in the restoration of the apparently drowned. The author considers that recovery was mainly due to the traction on the tongue and with Dr. Gilchrist, of Nice, suggests that it should be made widely known throughout the lay press that traction on the tongue, repeated regularly fifteen times a minute, is a highly efficacious treatment in many cases of apparent death from asphyxia.—*Brit. Med. Jour.* through the *Lancet* (Winnipeg) Vol. VI, p. 68.

BRAZILIAN EVIDENCE ON THE GENESIS OF THE DIAMOND.—Orville A. Derby (*J. Geol.* 6, 121-146) gives a very complete summary of the facts afforded by the diamond washings of Brazil, that have a bearing upon the origin of this gem; and a comparison with the evidence from the "dry diggings" of South Africa. The conclusion is that the diamond is to be regarded as of metamorphic, and not of truly igneous origin.—*Technology Quarterly*, Vol. XI, p. 106.

CALCIUM CHLORIDE IN HEMORRHAGE.—Hare (*Columbus Med. Jour.*, August 29, 1898) calls attention to the value of calcium chloride in the treatment of small oozing hemorrhages. Dr. Wright pointed out some years ago that the use of calcium chloride distinctly increases the coagulability of the blood; but he also pointed out a fact which must not be forgotten, viz., that after calcium chloride is given in full dose for a number of days a reverse effect is produced, and that delay in coagulation occurs under its influence. The use of the drug should not be persisted in for too long a time.—*Univ. Med. Jour.*, October 1898.

HARA-KIRI.—Dr. Richard H. Harte (*Annals of Surgery*) describes this form of self-destruction which is practiced by Japanese *Samurai* (gentlemen of the military class). The ceremony as carried out by the Japanese is briefly as follows: The condemned, in the presence of only his friends and the high officers of the court, sits upon a slightly elevated platform. A sharp knife is handed him, which he plunges into his abdomen to the left and below the navel, draws it transversely across to a corresponding point on the opposite side and then removes it. He now inclines forward and a *kaishaku* (executioner) cuts off his head with one blow of a sharp sword.—*Ibid.*

RATS AND THE PLAGUE IN INDIA.—According to the *Lancet* (London) evidence that the rat is a factor in propagating the plague, is gradually increasing. At Karachi the observation has been made that the occurrence of a case of plague is not infrequently preceded a few days by the finding of dead rats; this was particularly noticed in the first two or three cases of the recent outbreak. Mice and cats have also been found to suffer from plague. Although so much attention is given to the disinfection of clothing, the evidence that the disease is ever conveyed by this means is very doubtful. The conveyance of the disease by infected rats in grain bags is more probable, as dead rats have been found among the piles of imported bags, and as the disease is very virulent in this species of animal, it is reasonable to suppose that by this means the disease is chiefly spread.—*Scientific American*, 1898, p. 72.

RESEARCH ON THE PRESENCE OF HYDROCYANIC ACID IN VARIOUS PLANTS.—A. Hébert finds (*Bulletin de la Société Chimique de Paris*) that this acid does not occur in plants in sufficiently large quantities to be protective. Certain Japanese plants which contain a comparatively large quantity are only seriously toxic in doses of 300 to 400 grammes. Many others, containing a normal quantity, would require several kilos, to be ingested for any harm to be done.—*Chemical News*, Vol. LXXVIII, No. 2018, p. 60.

REACTION OF PHOSPHORIC ACID ON GLYCERIN.—M. M. Adrian and Trillat (*Bulletin de la Société Chimique de Paris*) show that there is not yet a method known for obtaining phospho-glyceric acid in the pure state—that the acid is decomposed by heat, and even by concentration *in vacuo*, re-forming phosphoric acid.—*Ibid.*

THE DETECTION OF A YELLOW AZO DYE USED FOR THE ARTIFICIAL COLORING OF FATS.—J. F. Geisler (*J. Am. Chem. Soc.*, 20, 110) gives a test which consists in adding a small quantity of Fuller's earth to the fat, placed in a porcelain dish. A pink or violet color is produced if the dye is present. The

test will detect 14 grains per ton or one part per million with ease, and may be used to indicate 0.00000005 mg. of the dye.—*Technology Quarterly*, Vol. XI, No. 2, p. 59.

HYGIENIC METHODS IN HANDLING BREAD.—A recent and novel improvement for the handling of bread, and which has been patented, has been adopted in Berlin. Paper bags are used which are the exact shape of the various sizes of bread turned out by a baker. These are open at both ends, and, being slightly longer than the loaf, the ends are turned together with a twist as the loaf is shoved from the oven straight into the bag. This cover protects the bread from pollution during transportation and is also intended as a protection while the loaf is being used, it being cut at one end as the loaf gets shorter. No doubt such a plan would be received with much satisfaction by the consumers in this country, and, since the name of the baker could be printed on the wrapper, it would also furnish a means of advertisement.—*The Sanitary Record*, through the *Journ. of Med. and Science*, October, 1898.

ECZEMA OF THE LIPS CAUSED BY MOUTH WASHES AND TOOTH POWDERS has been observed by Professor Weisser (*Wien. Klin. Wochenschr.*). In some cases the trouble continued a few months, and in one instance it lasted two years. It is interesting to note that the eczema became markedly improved with the discontinuance of mouth washes and tooth powders containing olive or peppermint oil; and it, therefore, appears that ethereal oils have a bad effect on dermal affections existing near the lips and oral cavity.—*Pediatrics*, Vol. VI, No. 6, p. 280.

A CASE OF LEAD POISONING FROM THE USE OF SODA WATER is reported by Dr. Jamieson in the *Intercolonial Med. Journ. of Australasia*, 1898. The patient, a medical man, drank about three pints daily of soda water made in an ordinary seltzogene, and which, on examination, yielded a considerable amount of lead. The author makes some precautionary suggestions in regard to the use of such soda water.—*The Medical Chronicle*, Vol. IX, p. 461.

DR. SANARELLI'S YELLOW FEVER SERUM has been ordered from the syndicate in Monte Video by three European Governments, and the last Royal Mail steamer brought several tubes of it to the Spanish and Italian Governments, and also a quantity for the British Government, to be forwarded to the Bahamas.—*The Chemist and Druggist*, October 15, 1898.

QUININE FOR HYPODERMIC USE.—According to a note in *Les Nouveaux Remèdes*, the following gives the most suitable solution for all hypodermic uses: Quinine hydrochloride, 3 grammes; antipyrine, 2 grammes; water, 6 grammes. Santesson, of Stockholm, in examining the matter, has shown that the association of quinine and antipyrine leads to the formation of a definite compound—quinopyrine, he terms it—of which the toxicity is less than that of quinine. On the other hand, Stoffela states that the association of the two bodies is useless. He prefers to act as follows: He places 2 grammes of quinine hydrochloride, which has a faintly alkaline reaction, in a test tube, with 100 c.c. of distilled water. Heating to about 40° causes complete solution. The quinine is deposited as cooling, but not for some time, so that the solution can be used warm, and the alkaloid will remain in solution at the temperature of the blood.—*The British and Colonial Druggist*, October 14, 1898.

NOTES AND NEWS.

CROTON OIL.—M. Javillier (*Jour. de Pharm. et de Chim.*, Vol. VII, No. 2) finds that the oil prepared by simple pressure, by lixiviation with ether at 0.758, or by double digestion at 75° in alcohol at 95° has different appearances, gives different results on analysis and also different returns; the first gave 12.5 per cent., the second 38 per cent., and the third 12 per cent. In summing up the results of analyses, it appears that the oil extracted by alcohol differs considerably from the other two, which are almost identical.—*Chemical News*, November 18, 1898.

COMPARISON OF STANDARD METHODS FOR THE ESTIMATION OF STARCH.—H. W. Wiley and W. H. Krug (*J. Am. Chem. Soc.*, 20, 253-266) give a large amount of experimental data which prove all the existing polarimetric methods for determining starch are unreliable. The Lindet method is only approximate. The diastase method gives satisfactory results providing precautions are taken to pulverize the sample to extreme fineness and allow sufficient time for the action of malt, preferably containing pepsin. It is recommended to remove the fat first and also to repeat the malt treatment after boiling and cooling. While noting that the results of cereal analyses are at best but approximate, the authors do not believe that any constituents are present that are unaccounted for unless amounts of complex carbohydrates so small as to be reasonably negligible.—*Technology Quarterly*, Vol. XI, No. 2, p. 60.

GREEN GUTTA PERCHA, according to *Technische Berichte*, is now produced from the leaves of the caoutchouc tree, and is said not only to possess all the advantages of the article obtained by incision into the stem, but even to excel it in durability, so that it can enter into use industrially and commercially in a hitherto unknown way. It is readily prepared and cheap in price, not requiring an expensive purification, which heretofore increased the price of the product 15 to 25 per cent. Besides, it is highly plastic, very strong, can be divided into the thinnest leaves and receives the most delicate and at the same time most distinct impressions by molding and pressing. Moreover, it withstands the action of water and the strongest acids, and even in a worn and broken-up condition is still worth 25 per cent. of its cost of production. The French mail and telegraph department has already commenced its use for the construction of submarine cables.

Schweinfurth, by the way, is said to have discovered in Central Africa a tree, called "tsofar" by the natives, from which also exudes a gum already introduced in commerce. This tree possesses the remarkable quality of giving off flute-like sounds when the wind blows through its branches. These are caused by an insect penetrating into the wood, in order to obtain the gummous substance, thus transforming the tree into a huge Pan flute.—*Scientific American*, Vol. LXXIX, No. 7, p. 102.

THE EFFECT OF TOBACCO ON THE DEVELOPMENT OF THE YOUNG is the subject of an editorial in the issue of *Pediatrics* of December 1st. It is pointed out that the cigarette habit with the young is so enormously on the increase in many countries of the world, notably England, that much alarm is expressed with regard to its evil effects, and legislative measures are said to be in contemplation to restrict the sale of tobacco. Commenting further on the sub-

ject, the writer says: "We take it to be the duty of scientific men who have made a study of the matter to continue to place the results of their researches before the public, so that at least it should not be said that the young slaves to the tobacco habit have not had the opportunity of learning the truth." In this connection some instructive statistics are given. From measurements of 187 of the Class of 1891, Yale, it was found that the non-smokers gained in weight during the college course 10.4 per cent. more than the regular smokers, and 6.6 per cent. more than the occasional smokers. In height the non-users of tobacco increased 24 per cent. more than the regular, and 12 per cent. more than the occasional users. In increase of chest girth the non-users had an advantage of 26.7 per cent. and 22 per cent., and an increase of lung capacity of 77.5 per cent. and 49 per cent. respectively. These observations are corroborated by statistics obtained at Amherst during the same college year. The statement is also made that in France the difference between the students in the polytechnic schools who smoked cigarettes and those who did not, in scholarship, was so great that the government prohibited absolutely the use of tobacco in all the schools under its supervision.

THERAPEUTIC ACTION OF VERATRUM ALBUM AND V. VIRIDE.—According to Cartier, of Paris, these two species of veratrum have some properties in common and also some that are different. He finds that there is too much tendency to prescribe veratrum without the distinctive title, which is usually interpreted to mean veratrum album, thus ignoring the peculiar properties of veratrum viride. In discussing their respective properties, the author states that veratrum album is not indicated in febrile conditions or in congestions, whereas veratrum viride is usually recommended in acute inflammatory fevers.—*Medical Counselor*, through *The Hahnemannian Monthly*, 1898, p. 796.

THE VALUE OF ALCOHOL AS A DISINFECTANT.—Gomer (*Centrabl. F. Gyn.*, May 7, 1898), reporting on a series of experiments which he conducted at the Women's Hospital at Bâle, concludes that alcohol is a much less active disinfectant than sublimate. It fails wholly with the streptococcus, and is totally unreliable for killing spores. To be of any direct value as a germicide it must be used in large quantities, the hands being completely submerged in it during the scrubbing. Merely wetting the skin with alcohol helps only by facilitating the action of the sublimate solution.—*The Brooklyn Medical Journal*, 1898, p. 766.

THE USE OF A BLUE GLASS BETWEEN THE SOURCE OF ILLUMINATION AND THE OBJECTIVE.—In artificial colors, white light is composed of three primary colors, blue, red and yellow. This is not true of sunlight, the primary or fundamental colors of which are composed of red, green and violet. Our lamps generally emit a more or less reddish-yellow light. To correct this, use a piece of the proper blue glass obtained for the purpose from a microscopic dealer. The blue adds the other primary and makes the light practically white. After becoming accustomed to the blue glass it will be very uncomfortable to use the microscope without its aid.—*The Am. Month. Micros. Jour.*, 1898, p. 156.

SUNSTROKE AND BACTERIA.—It is stated in *Natural Science*, May, 1898, that Dr. Lugin Sambon makes a clear distinction between the cases reported as sunstroke, which are due only to syncope and those attended with thermic fever, which he attributes to a specific organism. It is shown that the disease has

definite symptoms and a definite geographical distribution. One evidence that the disease is not due to heat is found in the fact that people in certain regions or under artificial conditions, work in temperatures far higher than exist in places where sunstroke frequently occurs, without suffering from the disease. True sunstroke seems to be confined to certain low-lying countries, where the climate is moist, and absent from more elevated and dry regions. The author compares the bacterium with that of tetanus, claiming that it lives in the soil, and is carried into the system with dust.—*The American Naturalist*, Vol. XXXII, p. 533.

BACTERIA IN GROUND WATER.—The readiness with which bacteria may be conveyed to wells in sub-surface water has been shown in some experiments made on the Rhine near Strasburg, by Prof. E. Pfuhl. Two kinds of bacteria, neither occurring in the Rhine, were placed in a shallow pit nearly full of water and in one hour one species had passed through 24 feet of gravel to a second pit, the other species appearing in the second pit within two hours.—*Microscopical Journal*, 1898, p. 205.

PRESERVATION OF EGGS.—A note is given (in the *Landw. Centralbl. Posen.*, 1897, p. 209) on the successful preservation of eggs by burying them in peat dust. J. H. Thierot (U. S. Consular Reports, 1897, p. 563) gives a report of tests made in Germany of twenty methods of preserving eggs. The most satisfactory methods were (1) to varnish eggs with vaseline and preserve in lime-water, or (2) to use a solution of water-glass. The latter to be preferred, as the coating of the eggs with vaseline takes considerable time, and the lime-water is likely to give them a disagreeable odor and taste. There is, however, one drawback with eggs preserved in a solution of water-glass, viz.: that the shell easily bursts in boiling water. This may be avoided by cautiously piercing the shell with a strong needle.

PASTEURIZATION OF MILK.—C. E. Marshall (*Mich. Sta. Bul.*, 1898, p. 21) has made some experiments on the micro-organisms that are found to be resistant to pasteurization.

In each of twenty-six experiments two bottles of the pasteurized milk and two bottles of the same milk unpasteurized were taken as samples, one set being tested for acidity and the resistant bacteria, and the other set being kept until it spoiled. The data for these samples are given. From the pasteurized milk thirty-nine varieties were isolated and studied. The characteristics of nineteen varieties are given, since these are believed to be representative of the whole. The source of these resistant bacteria was studied by making numerous plate cultures of the dust in the air of the stable, the animal, etc. From these bouillon cultures were made of the different kinds of bacteria, and these cultures were pasteurized. Of those which resisted pasteurization two were from the dust of the stable, two from the dirt from the cow, one from the dairy, and three from the first part of the milking.

As to the effect of these resistant bacteria on the milk after pasteurization, it was found that some only curdled the milk, some peptonized the casein, some did both, while others produced no perceptible change in the milk.

A special experiment on the thermal death point of tubercle bacilli showed that heating the milk containing them at 68° C. for twenty minutes destroyed the bacilli, so that the milk had no injurious effect when inoculated into guinea

pigs. A study of the thermal death points of the resistant bacteria showed that seventeen of the nineteen forms were not killed by a temperature of 80°C . for twenty minutes; six remained alive after heating the same time at 90°C ., and one at 96°C ., but all were killed by boiling twenty minutes. The effect of sudden cooling after pasteurization upon six of the resistant varieties was studied in a series of tests on bouillon cultures of these bacteria. In each case one culture was cooled suddenly to 8°C . and another allowed to cool gradually to the temperature of the room, the time required for development being noted in each case.

"In this work ten cultures of the suddenly cooled exceeded the time of development of the noncooled; twelve cultures of the noncooled or cooled gradually exceeded the time of development of the cooled; six cultures of the suddenly cooled developed in the same time as the noncooled. Sudden cooling seems to have no effect on the time of development."

The restraining influence of keeping at a low temperature on development was shown in trials with the same six species. Six miscellaneous micro-organisms were treated in the same way but not subjected to pasteurization. Here it was noticed that the time of development was retarded several days by placing them in the refrigerator. The effect of continued heat in restraining development was illustrated in trials with the six same cultures. When the six cultures were pasteurized and then kept in a refrigerator very few of the germs developed in forty-five days.

In conclusion, remarks are made on the value of pasteurization, especially in preventing contagious diseases and intestinal disorders of young children.

IMBEDDED TISSUES WITHOUT USE OF ALCOHOL.—A. Dollken (*Zeitsch. Nuki.*, 1897, p. 32; *Jour. Roy. Micros. Soc.*, 1897, p. 448) proposes the following method:

Where animal or vegetable tissues contain substances soluble in alcohol or ether and thin sections are needed, they may be fixed in chrome-osmium acetic acid and in picric acid solution, after which they may be imbedded in gum and exposed for twenty-four hours to the action of acetone vapor at ordinary temperature. Thinner sections than those obtainable by this method may be obtained according to the following method: Small pieces of tissue fixed in 10 to 20 per cent. formalin are placed in a capsule to which some resorcin and glycerin are added. The mass stiffens in a short time and is capable of being sectioned in a few hours. It may be fixed to the block of the microtome with water glass or syndetikon, and should be sectioned at once, as it soon becomes very hard.

The author also obtained good results by imbedding in soap made as follows: Castor oil or stearic acid, with 20 to 30 per cent. of caustic soda, is boiled for awhile, and, after cooling the alkali, removed by pressure, dilution, or by frequently dissolving the soap. A piece of tissue about 1 c.c. high is transferred from the formalin to a 3 to 5 per cent. solution of soap made with distilled water, and allowed to remain in it 36 to 72 hours in a covered vessel. Solidification is brought about by evaporation or by means of powdered Glauber salts. The block is then fixed to the microtome with water glass and the sections are cut dry. They roll somewhat, but may be straightened in water. The soap must be washed out before staining. The addition of 5 c.c. of glycerin and of alcohol to each 55 c.c. of the soap solution greatly aids in orientation.

NOTES AND NEWS.

WM. R. WARNER & CO. sustained a very heavy loss from the burning of their office buildings at 1228 Market Street, Philadelphia, on February 17th. The entire stock together with the building were completely destroyed, but the full extent of the loss cannot be estimated until their fire-proof safes have been recovered. They have improvised an office and stock room at their laboratory, 639-41-43 North Broad Street, and are enabled to supply goods with their customary promptness.

DR. O. LOEW is now the expert in Chemical Physiology of Plants in the Division of Vegetable Physiology and Pathology of the U. S. Department of Agriculture. This Division is one of the strongest in the Department as the experts represent the best talent in botany. Dr. Loew is at present occupied with the question of tobacco curing and fermenting, on which he has made a series of new observations, and which will be published shortly in a Bulletin. Other problems as those on the "function of the mineral constituents in plants;" "the easy destruction of plant parasites," and "also studies in the relation of various organisms in water," etc., are being investigated.

UPPER REGIONS OF THE AIR.—In a very interesting article in *The Forum* for January, having the foregoing title, Professor Trowbridge, of Harvard University, accounts for the phenomena of the Northern Lights, thunder storms and the magnetism of the earth on the hypothesis that the very short waves of light or energy from the sun are absorbed by our atmosphere and converted into electrical and magnetic waves. The long waves of energy from the sun are called heat-waves, and the intermediate waves, light-waves, both of which we receive in full measure, while the short waves are stopped by our atmosphere and manifested in other ways, as already indicated by the proposed hypothesis. That the sun is concerned in these phenomena the author considers consistent with the great modern doctrine, that all the energy we receive from the sun is electro-magnetic. This hypothesis becomes all the more interesting when, in these later days, as stated by the author, all the observed phenomena of electricity point to the truth of the theory that light, heat and electricity differ only in wave-length.

NEW METHOD OF WATERPROOFING PAPER.—The German journal *Neueste Erfindungen* describes the following method of making a waterproof paper: The sheet is coated on both sides with a solution consisting of 1 part gelatine, 4 parts water and 1 part glycerine. When dry, the paper is immersed in a 10 per cent. solution of formalin. After this treatment, the paper is said to become impervious even to steam.—*Jour. of the Franklin Institute*, 1899, p. 73.

THE PELLETIER-CAVENTOU MEMORIAL.—The total list of subscriptions—which is hardly likely to be much increased now—to this memorial totals up to 12,926 francs. Very few but Frenchmen have subscribed to it.—*The British and Colonial Druggist*, 1898, p. 93.

WASTE OF SWEEPINGS IN STREET CLEANING.—The Department of Agriculture estimates this loss in 354 cities at \$3,000,000 annually.

LEAD AS AN ABORTIFACIENT.—The *Lancet* records the case of a married woman, aged 23 years, whose health was described as having previously always

been excellent and who had taken pills of diachylon for the avowed purpose of bringing on a miscarriage. Some days before the fatal issue she had complained of the "use" leaving one of her hands. Subsequently she was seized with violent cramps and pains, writhing in agony, with blood running from her mouth, and she never rallied.

ASSAY OF SENEGA.—Ed. Kremers and Martha M. James (*Pharm. Rev.*, 1898, p. 45) show that the fact that methyl salicylate can be obtained from most samples of senega root by distillation with steam is not a satisfactory criterion in testing for this drug. Samples known to have been false senega yielded the salicylate, while some true senegas did not. The authors point out the fact that the addition of acid in the distillation increases the yield of methyl salicylate, which is evidence that this ester is a product of hydrolysis, perhaps of a glucoside.

ACTION OF HYDROGEN ON ACIDS.—Berthelot has shown that hydrogen has no action upon sulphuric acid at the ordinary temperature. If both are heated together for six hours, at a temperature of 250° C. the reaction is the following:



Upon sulphurous acid as well as nitric acid containing water, hydrogen has no action either at the ordinary temperature or when heated to 100°–280°.—*Comp. rend.*, 1898, p. 743.

ADULTERATION OF EXTRACT SECALIS CORNUTI.—Italo Cepellini finds that *Succus Sambuci* may be added to extract *secalis cornuti* to the amount of 30 per cent. before it is detected by the trimethylamine test on adding potassium carbonate, or may be observed either by taste or odor in the aqueous or alcoholic solutions.—*L'Orsi* through *Pharm. Zeit.*, 1898, p. 364.

SOMATOSE PREPARATIONS.—The following is a new manner of preparing solutions of somatose, ferro-somatose and lacto-somatose.

Place the powder on the surface of one-quarter to one-half glassful of hot water, and allow the fluid to stand undisturbed (without stirring) for about fifteen minutes, when a complete solution will have been effected. Then, if desired, add to broth, soups, milk, beer, etc.

ADULTERATION OF SICILIAN SUMACH.—In an investigation on the leaves of those plants which are employed for the adulteration of Sicilian sumach (*Rhus coriaria*) R. G. Perkin and P. J. Wood (*Chem. News*, 1898, p. 208) describe the following:

(1) *Shinia* leaves (*Pistacia lentiscus*) contain 11.3 per cent. of tannin. Two tannins appear to be present, one yields gallotannic acid and the other forms a poison with alkali, acetic acid, phloroglucinol and gallic acid. The coloring matter has the formula $\text{C}_{15}\text{H}_{10}\text{O}_8$, and crystallizes in colorless needles, having a M. P. 204°–206°. It is identical with myricetin, the coloring matter of *Rhus coriaria*. The leaves of *Ailanthus glandulosa* contain quercetin and 11.9 per cent. of tannin. This is a mixture of ellagitannin and gallo-tannin, and a worthless tanning agent. The leaves of *Ficus carica* contain a coloring principle resembling quercetin. The tannin is small in amount, being 1.6 per cent.

ACONITUM COLUMBIANUM, NUTT., known also as "iron hat," "storm hat," "blue weed," "wolfsbane," "friar's cap," and "monkshood," is found in moist open woods and alongside of brooks in the mountains from Washington and Oregon southward to Lake County, Cal., and the southern Sierra Nevadas (occurring sparingly in Arizona), and eastward in the mountains to Montana, Wyoming, Colorado and as far south as South Dakota. Four other species of aconitum are native to the United States, and a fifth, the common monkshood of Europe (*A. napellus*), is a common garden plant. The western species (*A.*



columbianum, Nutt.) of our American plants is of most interest to us in the United States, as it is the most abundant and most widely distributed. The illustration is taken from Bulletin No. 20, U. S. Department of Agriculture, Division of Botany, with the permission of Professor Coville.

ALKALOIDS OF CURARE.—R. Boehm. (*Arch. d. Pharm.*, 1897, No. 9) has investigated the Tubo-Curare (Paracurare) of Brazil and Peru. The principal alkaloid is *Curine*, which has the formula $C_{18}H_{19}NO_3$, forms white crystals with

M. P. 161° , and is with difficulty soluble in absolute alcohol, methyl alcohol and benzol, while soluble in dilute alcohol and chloroform, and almost insoluble in water. Another alkaloid *Tulocurarin*, which is obtained from the mercury compound of curine by means of carbon disulphid is an amorphous, reddish-yellow mass of great toxic properties, .001 gramme, killing a dog weighing 1 kilogramme. The iodine compound has the formula $C_{19}H_{22}NO_4 \cdot I$.

Another curare (*Calebassencurare*), produced in Venezuela from *Strychnos toxifera* Benth contains *curarin*, which is extracted by means of water, precipitation with platinic chloride and taking up with ether after decomposing the platinum compound. The toxic properties are 0.34 milligramme, killing a dog weighing 1 kilogramme. The iodine compound has the formula $C_{19}H_{25}N_2O \cdot I$.

Another curare yielded by the bark of *Strychnos castelnaea*, Wedd., yielded *protocurarin* occurring in colorless crystals insoluble in water, and sparingly soluble in ether, chloroform and alcohol. Another alkaloid *protocuridine* is also yielded by this curare, which is exceedingly toxic in its properties.

An examination of a number of barks of the genus *Strychnos* indicated the presence of the curarine as being in the cork, whereas curine is found in the remaining tissues. This still requires further examination.—*Apoth. Zeit.*, 1898, p. 293.

SENECIO AUREUS AS A HÆMOSTATIC.—Gundrum (*Therap. Gaz.*, 1898, p. 655) finds the fluid extract of *Senecio aureus* the most valuable of all remedies in all forms of parenchymatous hemorrhage. It is given in doses of 1 to 2 fluidrachms, and may be prescribed with confidence in all forms of internal bleeding.

YELLOW COLORING OF EUCALYPTUS LEAVES.—From an examination of the leaves of *Eucalyptus makrorhyncha*, of New South Wales, H. G. Smith (*Jour. Chem. Soc.*, 1898, p. 697) obtained 10 per cent. of a yellow coloring matter which he called *Myrticolorin*. It is a glucoside and fills a gap between *osyritrin* obtained by Perkin from the leaves of *Colpoön compressum* and *Violaquercetin* obtained by Mandelin in *Viola tricolor variensis*.—*Chem. Zeit.*, 1898, 247.

ADULTERANT OF SARSAPARILLA.—A product from the River Amazon is described by Hartwick (*Pharm. Zeit.*, 1898, 684) as resembling in external appearance and in structure genuine sarsaparilla. It contains neither calcium oxalate crystals nor starch, and in the place of the latter sugar is found. It is supposed to be the product of a plant of the N.O. Liliaceæ.

NEW STRYCHNIN COMPOUNDS.—Tapel has obtained a *Desoxystrychnin* by the action of boiling HI and phosphorus and strychnin. The formula is $C_{21}H_{22}N_2O$, and it gives the specific action of strychnin. Upon treating desoxystrychnin with sodium in boiling amyl alcohol a base is obtained $C_{21}H_{22}N_2$ called *strychnolin*, which does not act like strychnin. These results would seem to indicate that the peculiar action of strychnin is due to a piperidin-like atom group, and therefore the author experimented to reduce this group without destroying the molecule. By the electrolytic reduction of strychnin he obtained two compounds, viz., *strychnidin* ($C_{21}H_{21}N_2O$) and tetra-hydro-strychnin ($C_{21}H_{26}N_2O_2$). The physiological action of these substances showed that the peculiar action of strychnin is not due alone to the molecule of the piperidin-like group, but also in part to the oxygen-containing group.—*Chem. Zeit.*, 1898, p. 246; from *Lieb. Ann. Chem.*, 1898, p. 285.

NOTES AND NEWS.

PROF. RUDOLF KOBERT is no longer Director of the Sanatorium Brehmer at Gorbersdorf-Silesia, but is again Professor of Pharmacology and Physiological Chemistry in Rostock-Mecklenburg. This is welcome news as we shall look for further contributions to the literature of this subject from him.

HISTORY OF THE MASSAGE TREATMENT.—This form of treatment, as now practiced by modern Europeans and other English-speaking nations, originated in Sweden, but according to the legends of their country the Chinese were the real originators of massage and other forms of physical exercise.—*Scientific American*.

ARSENIC IN TEA.—An ingenious microbiological method is employed by Morpurgo and Brunner (*Giornale di farmacia*, 1898, p. 195). They place the material containing arsenic in the middle of a piece of potato ready for culture and sow on it the spores of a fungus *Penicillium brevicaulis*. Arsenous acid is given off, which is caught in a potassium bitartrate solution and estimated.—*Pharm. Centralh.*, 1898, 670.

MENTAL TELEPATHY.—In these days, when our views with regard to the seen and unseen are becoming more and more rational, partly on account of recent psychological researches, the following from the *Lancet* may be of interest: Sir William Crookes, as is well known, has been bold in expressing his views on what most people consider to be occult subjects, and he has been taken to task for his attitude as a scientific man on these questions. He has been silent for some time, but he evidently felt that the trend of public thought has changed, and so he reverted to a subject which has recently attracted the attention of recognized men of science. Sir William Crookes believes the fundamental law of telepathy to be "that thoughts and images may be transferred from one mind to another without the agency of the recognized organs of sense, that knowledge may enter the human mind without being communicated in any hitherto known or recognized ways." The subject obviously presents many difficulties in the way of practical inquiry, investigation and elucidation; but we do not doubt that some are prepared to accept this postulate. Molecular movements occur in the brain during thought processes, and it is conceivable that physical vibrations are set up, capable, from their extreme minuteness, of acting directly on individual molecules, while their rapidity approaches that of the internal and external movements of the atoms themselves. We need only refer to the Roentgen ray phenomena and the transmission of electric waves without wires in order to find an analogy which lends considerable assistance to the idea.

ELECTRIC SUNSTROKE.—It is reported by the French physician Lavraud that an engineer exposed for an hour, at a distance of about 3 feet, to the rays given out by two connected arcs under a current of 15 amperes, manifested in about three hours all the symptoms of sunstroke. The affection was attributed to the chemical rays, and not to the intensity of the heat, the patient having been situated in that part of the cone of rays where the light was least, but the chemical activity greatest.—*New York Medical Journal*.

ON THE HÆMOCYTOZA OF BIRDS.—Opie (*Jour. Exper. Med.*, 1898) examined 125 birds. The majority of them were obtained from places notoriously malarial; 80 of these birds were English sparrows, and 12 red-winged blackbirds; the others belonged to a variety of species. Fifteen of these birds showed intra-corpuseular parasites in varying abundance. Two forms of the parasite were distinguished which correspond to those described by Grassi and Filletti. In some of their stages of development the parasites resembled the malarial parasite of man; and it may also be noted that both forms of parasites were present in some cases.—*Amer. Jour. Med. Sciences*, Nov., 1898.

FOREIGN BODIES IN THE EAR.—Hummel (*Munchener med. Woch.*) makes the following deductions: (1) The relation of the normal ear canal to inanimate foreign bodies is entirely without reaction; that is, the foreign body in the ear does not, *per se*, endanger the integrity of the ear. (2) Every hasty endeavor at removal is, therefore, not only unnecessary, but can become very injurious. It was also stated that in nearly all cases not previously interfered with, the foreign body could be removed from the ear by syringing. In cases requiring instrumental removal of the foreign body from the ear it was recommended that only specialists in this line should undertake the operation.—*Dunghison's College and Clinical Record*, 1898, p. 194.

DETERMINATION OF TARTARIC ACID IN PRESENCE OF CITRIC ACID.—Borntraeger (*Zeitsch. f. anal. Chem.*, 1898, p. 8) uses a test which depends upon the fact, that on the addition of calcium chloride to a solution (which has been neutralized with KOH) containing various amounts of citric and tartaric acids, the latter, on account of the excess of citric acid, is precipitated as potassium bitartrate.

COMPARISON OF METHODS FOR ESTIMATING CAFFEIN.—E. F. Ladd (*Amer. Chem. Jour.*, December, 1898) tried the four following methods for the estimation of Caffein in tea: Vite's, Peligot's, Crosschoff's, and Gomberg's, with the result that higher percentages were uniformly secured by Gomberg's method than by either of the others. Its simplicity is also an advantage in work where caffein has to be rapidly determined.

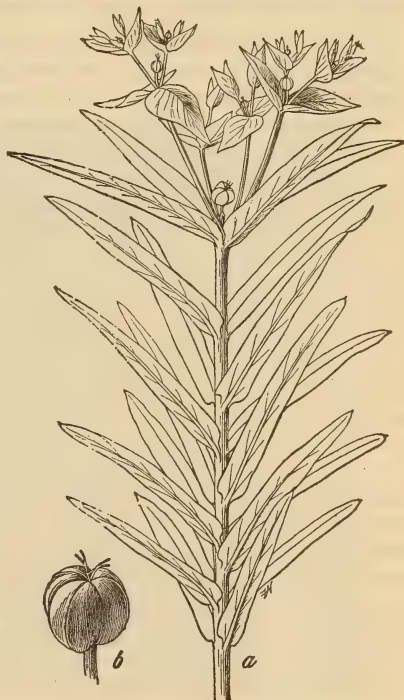
AN ACTIVE PRINCIPLE IN MILLET HAY.—On account of the diseased condition of horses, when fed exclusively on millet, which is known among farmers as the "Millet Disease," E. F. Ladd (*Amer. Chem. Jour.*, December, 1898) undertook to determine whether millet hay contained a principle capable of producing marked physiological effects. While the work was not completed, it was considered probable that the substance extracted by benzine was a glucoside. The principle most resembles daphnin, although markedly different from it in some respects. That the principle possessed marked physiological properties was shown by experiments described.

ATROSCIN AND I-SCOPOLAMIN.—T. Gadamer finds (*Arch. d. Pharm.*, 1898, p. 382) that atroscin (Hesse) and i-scopolamin (Schmidt) are hydrates of the same alkaloid. They possess different melting-points and different amounts of water. Further, atroscin is not a new alkaloid, but the labile form of i-Scopolamins, which is only obtainable under certain conditions.

CAFFEIN IN TEA, KOLA AND COFFEE.—J. Gadamer does not believe (*Ibid.*) that the percentage of bound (gebundenen) caffein in the drug should give it particular therapeutic properties, but is of the opinion that the variation of free caffein and that in combination in tea, coffee and kola explains the reason for such variation in the analytical results of different investigators.

CAPER SPURGE, which is also known as garden spurge, myrtle spurge, mole plant, mole weed, mole tree, gopher plant, anti-gopher plant, wild caper, caper bush, wolf's milk, springwort, is botanically known as *Euphorbia Lathyris*, L. It is a herbaceous perennial, 2 to 3 feet high. In the illustration given (which is taken with permission of Professor Coville, from Bulletin No. 2, Division of Botany, U. S. Department of Agriculture), the upper half of the plant, one-third natural size, is given, with a capsule (*b*) natural size. It is a common garden plant, sparingly introduced in wet grounds in California and Texas, and in the Atlantic States from New Jersey to West Virginia and North Carolina.

The fresh milky juice is exceedingly acrid and the fruit is highly purgative and poisonous. When used as a household remedy it often provokes serious trouble. Women and children are not infrequently poisoned by handling the plant and getting the juice on the face. Cattle are quite resistant to its influence, but they are sometimes overcome. Goats will eat the plant extensively if nothing better presents itself, and it is said that their milk then possesses all of the venomous properties of the plant. When applied to the skin the juice causes redness, itching, pimples and sometimes gangrene, the effect often lasting more than a week. The seed taken internally in overdose will inflame the mouth and stomach and cause intense diarrhœa and vomiting. If the dose is sufficient, there will be nervous disorders, unconsciousness, general collapse and death.



ALKALOIDAL DETERMINATION OF CINCHONA.—H. Ekroos (*Arch. d. Pharm.*, 1898, p. 328) employs KOH in place of ammonia and a freshly prepared solution of hæmatoxylin as an indicator. The method, which is also given in abstract in *Sudd. Apoth. Zeit.*, 1898, p. 649, may be applied to extracts of cinchona as well as upon the drug.

GLAZED BOOK PAPER BAD FOR THE EYES.—The effect of glazed papers on the eyesight has recently occupied the attention of some German doctors. In

comparing these papers with those in use in the earlier part of the century, which were mostly of a dull gray or blue color and coarse-grained, requiring thicker type, they point out that the highly glazed surface offers reflections of the light which, with the more elaborate and thinner type, produce a lot of shades and lights that are most trying to the eye. It is, therefore, proposed that the public inspectors of schools should order the use of sanitary paper for the eyes, by which it is meant that a glazed or highly polished surface should be avoided, and the colors chosen should rather be gray or light blue, but no white, and, in fact, no brilliant colors at all. The type should be clear and simple and not too thin.—*Invention through Sci. Amer.*, December 17, 1898.

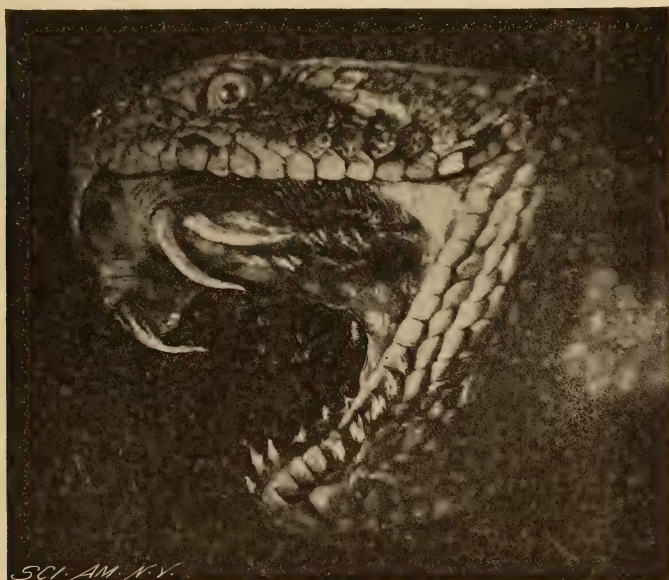
ALKALOID OF LETTUCE.—In an inaugural dissertation presented by A. F. P. van Sou at the University of Marburg, the author deals very freely with the derivatives of the tropins, but the parts which most interest pharmacists (*Chem. and Drug.*, 1898, p. 243) are on *Scopolia atropoides* herb and common lettuce, both of which have been reported to contain hyoscyamine. Dr. van Sou has gone most carefully into the matter, and finds that the scopolia herb contains 0.1258 per cent. of atropine, but no hyoscyamine. T. S. Dymond previously reported to the Chemical Society that he had found hyoscyamine in them. Dr. van Sou has now repeated the work, and while he was able to isolate a small quantity of an alkaloid, he finds that this alkaloid is not hyoscyamine, as Dymond stated, but atropine, because the double gold chloride which the alkaloid affords has a M. P. of 134°–140° C., which agrees with that of atropine gold chloride (136°–138° C.), but not with that of hyoscyamine gold chloride (159°–160° C.). Curiously, Dr. van Sou's results corroborate the observations which gave rise to Dymond's research. It may be remembered that Frank B. Thornton had occasion to examine an extract of lettuce supplied by a certain firm and isolated 0.03 per cent. of alkaloid from it which he identified as atropine. The experiments of Dymond went to show that the alkaloid present was hyoscyamine and the factors given in his paper undoubtedly proved that the alkaloid was not atropine. Against these results of Thornton we now have the opinion of two independent observers: which are we to accept?

ANEMONIN.—Noel and Lambert (*Arch. Internat. de Pharmacodyn. Through Pract.*, lxi, 74) conclude that anemonin is not the sole active principle of *Anemone pulsatilla*, and that it does not pre-exist in the plant. By distillation, an acrid oil (anemonol) comes over, which, probably by subsequent oxidation, produces anemonin. The observed pharmacological results obtained with anemonin and with the tincture of the plant are quite different. It is concluded that anemonin does not represent the whole therapeutic value of the plant.—*Pharm. Jour.*, 1898, p. 217.

GERANIUM OIL.—Flatau and Labbé (*Compt. rend.*, cxxvi, 1876) contradict the statement of Schimmel & Co. that the chief acid constituents of Indian geranium oil are equal parts of acetic and caproic acids. They find the chief ester to be a compound of geraniol with an isomer of myristic acid, from which the acid differs only in having a lower M. P., being 28.2° C., instead of 53.8° C. The formula is $C_{14}H_{28}O_2$. Besides this, acetic acid and traces of valerianic acid were isolated. Bourbon geranium oil did not give this new body, but about 1 per cent. of another acid having the formula $C_{16}H_{32}O_2$, half of which exists in the free state and the rest as a geranyl ester.—*Ibid.*, 1898, p. 217.

NOTES AND NEWS.

ABNORMAL DEVELOPMENT OF A RATTLESNAKE'S FANGS.—The photograph which is presented herewith was sent to the *Scientific American* by Dr. R. Menger, of San Antonio, Tex., and is a life-like representation of the head of the much dreaded rattlesnake, the *Crotalus horridus*. The following description appeared in the March 25th issue of the aforesaid publication, to whom we are also indebted for the loan of the cut. The original reptile was a very large rattlesnake, and was killed by a friend of Dr. Menger in the hills of Helotes, about eighteen miles northwest of San Antonio. The rattles and the head of this snake were presented to him and he prepared the fangs, etc., to show their relation to the poison glands. The head was supplied with four fangs, two full grown and two others near them in the front region of the upper jaw. The



exposure was taken by lamplight. The fact of the snake having four fangs is interesting. In all rattlesnakes there are, besides the poison fangs, rudimentary fangs which, upon the loss of the old fangs, develop and supply their place. In this case, however, the development has been abnormal, and the second pair of fangs have developed before any loss of the old fangs has been sustained.

SOLDER FOR GLASS.—A metallic compound which firmly adheres to glass is obtained by melting together 95 per cent. (by weight) of tin and five parts of zinc. The M. P. lies at about 200° (C.?) and the compound is spread upon the glass previously heated to this temperature, by means of a soldering iron. After it cools it adheres firmly to the glass. Another alloy, consisting of nine parts of tin and one part of aluminium may be used, but the M. P. is higher (about 390°).—*Scient. Amer.*, 1898, p. 230, from *Gold u. Silberwaaren Indus.*

TYPHOID FEVER.—Dr. Osler, of Baltimore, in an address on this subject before the New York State Medical Society, laid great emphasis on the fact that for very many years the medical profession had been fully alive to the true nature of typhoid fever. One fact stood out with special prominence—*i. e.*, that with clean soil and pure water typhoid fever disappeared. While many advances had been made in the treatment of this disease, they had been nothing compared to the triumphs of sanitary science. The medical profession could point to typhoid fever as the best understood and the most carefully studied of the acute infectious diseases—the one in which the greatest victories in hygiene had been won. But in spite of these triumphs, we had had a rude awakening last fall in the many soldiers who fell victims to this dread disease. Ours was a nation, Dr. Osler said, of contradictions and paradoxes—a clean people, careful in personal hygiene, but reckless regarding public sanitation. Dr. Smart, the great authority on hygiene, recently made the statement that the cities of this country, as regards the matter of water-supply, were at least a century behind the cities of Europe. In organized sanitation Michigan was one of the model States. The problem of typhoid fever, Dr. Osler declared, was no longer in the hands of the profession; even the lesson of the late war had probably not been bitter enough to teach the public that sanitary science should come within the sphere of practical politics. Our good-natured citizens, who always voted a straight party ticket, were not deeply interested in the problems of sanitary science; they were more easily led by a Perkins or a Munyon than by a Lister or a Koch. Our glorious land has been recently described as “God’s own country, with man’s own backyard, and the devil’s own cesspool.”

A CONCLUSIVE PROOF OF THE EFFICACY OF VACCINATION—conclusive to those who have not lost both their logical and their common sense—is furnished by the experience of the Germans, and especially of the German army. Dr. Bizzozzero, of Rome, according to the *Lancet*, thus summarizes the German experience:

“Germany stands alone in fulfilling in great measure the demands of hygiene, having in consequence of the calamitous small-pox epidemic of 1870-71 enacted the law of 1874 which ‘makes vaccination obligatory in the first year of life and revaccination also obligatory at the tenth year.’ What was the result? With a population of 50,000,000, having in 1871 lost 143,000 lives by small-pox, she found by her law of 1874 the mortality diminished so rapidly that to-day the disease numbers only 116 victims a year. These cases, moreover, occur almost exclusively in towns on her frontier. If it were true, continued Professor Bizzozzero, that a good vaccination does not protect from small-pox we ought to find in small-pox epidemics that the disease diffuses itself in the well-vaccinated no less than in the non-vaccinated countries. But it is not so. In 1870-71, during the Franco-German war, the two peoples interpenetrated each other, the German having its civil population vaccinated optionally, but its army completely revaccinated, while the French (population and army alike) were vaccinated perfunctorily. Both were attacked by small-pox; but the French army numbered 23,000 deaths by it, while the German army had only 278; and in the same tent, breathing the same air, the French wounded were heavily visited by the disease, while the German wounded, having been revaccinated, had not a single case.”

MANGANESE IN PLANTS.—In confirmation of the theory lately advanced of the importance of manganese in the vegetable and animal economy, P. Richard (*Compt. rend.*, 1898, p. 1882) finds that it is universally present in the ash of all forms of organized matter. Some are especially rich in manganese as the seeds of phanerogams and tissues of rapidly growing cryptogams. Its presence is indicated in cow and horse dung, various marine animals (molluscs and crustacea) and in the bones, eggs, flesh and hair of vertebrates.

ESTIMATION OF OIL IN AQUÆ.—Beckurts and Fierichs recommend the following modification (*Pharm. Zeit.*, 1898, p. 563) of Ranwez's method for the estimation of the volatile oil in aromatic waters: 200 c.c. of the water are placed in a separator and 60 grammes of NaCl added and the oil removed by repeated shaking with ether. The portions containing oil are united, dried with CaCl_2 and the ether distilled off until only 10–15 c.c. remain and the ether of this portion is removed by the aid of a filter pump. The temperature of the flask sinks to the freezing-point, thus preventing the escape of any volatile oil. When the ice on the sides of the flask ceases to form any longer, the connection with the pump is severed and the flask dried and weighed. The value of concentrated *Aquæ*, which contain more or less alcohol, cannot be estimated in this manner. *Aqua Fœniculi* and *Aqua Ment. Piperitæ* contain 6 per cent. volatile oil.

CANNABINOL.—T. B. Wood and W. T. W. Spirey have prepared the acetate of cannabinol. To this crystalline substance they assign the formula $\text{C}_{15}\text{H}_{18}\text{O}_2$, which differs from that given by Dunstan and Henry. They further find that the so-called cannabinol is not the active constituent of Indian hemp.

A GOOD FIRE EXTINGUISHER.—On September 2d (according to *Chem. and Drug.*, 1898, 574) a two-pound packet of colored fire exploded at Elgil's pharmacy, Durban, and immediately the flames spread, but the heat caused a bottle of ammonia to burst and this appears to have extinguished the fire, which was only discovered on opening the shop the next morning.

OIL OF OLIVE PITS.—Klein shows that the oil of the pits of the olive is made up of the same constituents (excepting arachinic acid, which is wanting entirely in the pits) as that of the pulp of the olive. There is a difference, however, in the quantities of the various constituents.—*Zeitschr. f. Angew. Chem.*, 1898, 37; *Pharm. Zeit.*, 1898, 723.

PERMANENT LEMON JUICE may be prepared (*Pharm. Rundsch.*) when the fresh juice is mixed with one-quarter its volume of talc powder, repeatedly shaken for some hours, allowed to stand and filtered. The filtrate is mixed with 10 per cent. sugar, boiled and put into bottles which have been previously treated with boiling water. They are then corked and sealed with paraffin.—*Sudd.-Apoth.-Zeit.*, 1898, 622.

NEUTRALIZING NICOTINE IN TOBACCO.—Gerald has found that (the *Med. Age.*, 1898, 565) if during the process of manufacture of cigars the leaves are steeped in a decoction, the principal element of which is wild marjoram (*Origanum vulgare*) the deleterious effects of tobacco are avoided, and yet the quality and aroma are not altered.

VASOGEN.—As regards the nature of Vasogen, it will suffice to state briefly, that it is an oxygenated hydrocarbon, *i. e.* a partly oxydized hydrocarbon, and that it has the power of rendering drugs which are incorporated with it soluble in water or emulsifiable with it. Owing to this property, vasogen employed externally forms emulsions with the secretions of the body, and thus becomes rapidly absorbed. This fact has been proved beyond question by the demonstration of the drug in the urine after inunction with iodine, iodoform, creosote and mercury vasogen. Medicaments like iodine, creosote, etc., when dissolved in vasogen, do not irritate the skin or mucous membranes, and consequently can be used extensively both internally and externally.

For external use, liquid vasogen preparations are poured into wounds or are applied to them on cotton or lint; they are also painted upon the intact skin or rubbed into it with the hand. In the latter case they should be plentifully applied, 10 drops to half a teaspoonful at a time and rubbed in gently until the vasogen has penetrated into the skin. Internally, the vasogens are taken in gelatine capsules (Caps. dur. Iodine vasogen, 6 per cent., Creosote vasogen, 20 per cent.), or mixed with milk, coffee, tea, wine or cognac.

Liquid vasogen preparations which have become thick by exposure to cold, rapidly regain their former consistency at a temperature of about 70°. Cold has no injurious effect, but marked heating is to be avoided. The bottles should always be kept well stoppered.

The following preparations are largely used in clinics, hospitals, etc., and are prescribed by physicians :

	Per Cent.
Iodoform vasogen	3
Iodine vasogen	6 and 10
Creosote vasogen	20
Menthol vasogen	2
β Naphthol vasogen	10
Camphor-chloroform vasogen	
Ichthyol vasogen	10
Guaiaicol vasogen	20
Sulphur vasogen	3
Tar vasogen	25

These preparations are made by dissolving the various medicaments in the liquid vasogen during its process of manufacture.

“HOPEIN” IN NEW ZEALAND.—*The Australasian Medical Gazette* has published a warning to New Zealand against the advent of “Hopein”—a bogus remedy for cancer—which it states, on the authority of the *Brit. Med. Gaz.*, contains 99 per cent. of morphine.—*The Pharm. Jour. of Australasia*, Vol. II, p. 242.

PROFESSOR ALPHONSO HERRERA, one of the most prominent botanists of Mexico, and for many years professor of medical botany in the National School of Medicine in the City of Mexico, has just been pensioned, according to Egeling, in *Meyer Brothers' Druggist*, with a salary of \$200 per month. Professor Herrera was born in the City of Mexico on February 7, 1838. He graduated in pharmacy when twenty years of age and for the past thirty years has filled the chair of professor of medical botany. His works on native medicinal plants are too numerous to mention.

NOTES AND NEWS.

RAILROAD ACCIDENT.—Among the thirty or more persons killed in the wreck which occurred on the Philadelphia and Reading Railroad, at Exeter Station, near Reading, on May 12th, was Mr. William Stahler, the well-known wholesale and retail druggist, of Norristown, Pa. Prof. Joseph P. Remington and Mr. Mahlon N. Kline, of this city, were on the train which was wrecked, but escaped without serious injury. Mr. Kline, save for the nervous shock which he sustained, was uninjured. Professor Remington was bruised about the knee and head, but we are happy to announce has about recovered.

HONOR TO AN AMERICAN CHEMIST.—Dr. Charles F. Chandler, Professor of Chemistry, Columbia University, and Professor of Organic Chemistry, New York College of Pharmacy, has been nominated President of the Society of Chemical Industry, which recently met in annual session in Glasgow, Scotland. Dr. Chandler may be said to be the most representative exponent of industrial chemistry in America. As a teacher he is without a peer. The honor of the Society is well deserved, and, we may say in turn, that the Society is honored by this action.

EDGAR F. SMITH, Professor of Chemistry in the University of Pennsylvania, has recently been elected Vice-Provost of that institution, to succeed Professor Fullerton, who resigned the office about a year ago. Professor Smith is eminent in his profession, and besides being very popular with the students has manifested much interest in the workings of the University, so that the honor is well deserved and the office judiciously bestowed.

J. B. NAGELVOORT, formerly Professor of Applied Chemistry at the Northwestern University (School of Pharmacy) is now an assistant in the *Pharmaceutisch-Laboratorium der Rijks-Universiteit*, Leiden. In connection with his work in the Laboratory he is engaged in special investigations for the Agricultural Department.

GIFTS OF CASH AND BEQUESTS from American citizens for colleges, libraries, hospitals and other institutions designed for public benefit aggregated \$38,000,000 last year. In the past six years these have amounted to more than \$200,000,000.

SUCCESSFUL CANDIDATES.—At the recent examinations of the Pennsylvania State Board of Pharmacy, held at Harrisburg and Pittsburg, 312 persons presented themselves for examination. Of this number eighty-one succeeded in passing the examination as registered qualified assistant pharmacist, and eighty-six as registered pharmacist, nearly 60 per cent. the largest ever passed. The next examination by the Board will take place at Williamsport, Pa., on Tuesday, July 11, 1899. Further information can be had by applying to Charles T. George, Secretary, Harrisburg.

CLEVELAND SCHOOL OF PHARMACY.—The graduating exercises of the Cleveland School of Pharmacy were held in the Colonial Hotel, Thursday evening, April 27th. Prof. H. V. Arny, who is a regular contributor to this JOURNAL, delivered the salutatory; the degree of Ph.C. was conferred by the President

of the School, Mr. E. A. Shellentrager ; Mr. Eugene R. Selzer made an address to the graduating class, and Mr. Bemis V. Spieth delivered the valedictory.

RECEPTION TO STUDENTS.—A reception was tendered to the members of the senior and junior classes and the faculty of the Maryland College of Pharmacy on the evening of April 14th by Charles E. Dohme, of Sharp & Dohme, who is the president of the institution, at his residence, 822 North Carrollton Avenue, Baltimore. Mr. Dohme was assisted in receiving by Mrs. Dohme, the Misses Dohme and Mrs. Dr. D. M. R. Culbreth. The parlors were invitingly decorated with palms, ferns and cut flowers, and a large company assembled. Refreshments were served, and an orchestra rendered music. The function was voted most enjoyable by all present. It has been the custom of Mr. Dohme for several years to give an entertainment of this kind during the latter part of the College term. Among the callers were Profs. William Simon, Charles Caspari, Jr., D. M. R. Culbreth, Daniel Base and John P. Piquett, of the College faculty ; Charles Schmidt, H. A. Elliott, H. P. Hynson, Samuel Mansfield, Louis Dohme, Dr. A. R. L. Dohme and others. The two classes were well represented.

AFFILIATION OF PHILADELPHIA BOTANISTS.—At a recent meeting held at the Philadelphia College of Pharmacy the following bodies effected an affiliation, whereby efforts will be made to promote the general interests of the botanists of Philadelphia and vicinity : The Philadelphia Botanical Club, Academy of Natural Sciences, Philadelphia College of Pharmacy, Philadelphia Moss Chapter, Lotus Club and the Mycological Society of Pennsylvania. The work of the affiliated societies will be in the hands of a Council composed of the presidents and secretaries (or two such representatives as each society may select) of each of the organizations represented. At a meeting on May 9th Geo. M. Beringer, A.M., was chosen chairman of the Council and Prof. A. F. K. Krout secretary.

MARINE BIOLOGICAL LABORATORY.—The twelfth session of the Marine Biological Laboratory at Wood's Holl, Mass., will be held from June 1 to October 1, 1899. C. O. Whitman, professor of zoology, of the University of Chicago, is director, and under him are an able corps of instructors. Courses of instruction will be given in zoology, including (1) morphological and embryological research, (2) cytological research, (3) embryology and (4) animal morphology ; general and comparative physiology ; comparative psychology ; and botany, including (1) cryptogamic botany, (2) plant cytology and (3) plant morphology and physiology.

It is interesting to note that two schools of pharmacy are represented on its corps of instructors, namely, the Philadelphia College of Pharmacy, by Prof. Henry Kraemer, and the University of Wisconsin, by Prof. Rodney H. True.

An excellent opportunity is afforded teachers and others who wish to do special and advanced work along the lines indicated, and a hearty co-operation of those interested in this class of work is desirable.

THE PHILADELPHIA EXPOSITION, under the auspices of the Philadelphia Commercial Museum and the Franklin Institute, will be held from September 14 to November 30, 1899. This is the first national exposition of American manufactures especially suited for export trade. Another event which will add

interest to the occasion commercially will be the Second International Commercial Congress, at which the important commercial nations of the world will be represented by specially appointed government delegates. Besides these delegates it is predicted that influential business men will come as representatives of over 300 of the leading foreign Chambers of Commerce of Latin America, South Africa, India, Australia, China, Japan and other countries.

Every facility for the full and free discussion of all topics of interest in international trade, by men practically interested and competent to consider all phases, will be afforded.

The undertaking has been characterized by a broad and liberal spirit and has received the support of the Congress of the United States, the Legislature of Pennsylvania, the Councils of Philadelphia, and has been supported and endorsed by trade organizations throughout the country.

REGULATIONS TO PREVENT THE SPREAD OF BACTERIAL DISEASES.—Governor Roosevelt, of New York State, has signed the bill to prevent the spread of bacterial diseases and permitting witnesses to dispense with the kissing of the Bible in the administration of oaths. It is very satisfactory to note that proper sanitary regulations have now reached even the police courts, where they were badly needed. For a long time, however, many of the magistrates have not used the Bible in the Court room, or have warned witnesses against using it, and great credit is due to Magistrate Pool, who inaugurated the move to do away with the kissing of the Bible in Court.—*Scientific American*, April 29, 1899.

AN ATTACK ON BACTERIOLOGICAL INVESTIGATION.—Not long ago an attempt was made by the Austrian Legislature to suppress bacteriological laboratories, but the Minister of Public Instruction and the chief of the sanitary department protested against such suppression in the interest of civilization, maintaining that all that is needed is greater care in the management of the laboratories. It is thought that the recent unfortunate occurrence of the plague in Vienna was the cause which excited the Legislature to assume this attitude.—*The American Practitioner and News*.

NEW HARDY EDIBLE ORANGES.—Under the auspices of the U. S. Department of Agriculture, effort is being made to produce hardier varieties of the orange by hybridizing with what is commonly known as the Hardy Orange, *Citrus* or *Limonia trifoliata* (properly *Triphasia Aurantiola*). Already, about 150 hybrids have been secured between them.—*Meehan's Monthly* for May.

PLANT FOOD.—The Supervising Committee of the Experiment Farm, at Southern Pines, N. C., have just issued a very valuable and important work on "Plant Food." The book is well printed and handsomely illustrated with many fine pictures. It would pay cultivators to read this book, which we understand, can be obtained free by sending to the Director, Experiment Farm, Southern Pines, N. C.—*Meehan's Monthly*, May, 1899.

THE PASTEUR MONUMENT AT LILLE was unveiled a few weeks ago by the French Minister of Agriculture, M. Viger, with due ceremony. The monument has been paid for by public subscription, and is placed on the Place Philippe le Bon, at Lille. It is noteworthy that a Pasteur Institute was opened at the same time.

SULPHUR IN CALIFORNIA.—A discovery of sulphur was recently made in San Diego County, Cal., which is likely to prove of great importance. The vein, which is nine feet deep is said to be 90 per cent. sulphur and about the purest natural sulphur in the world. The claims are located on a spur of the far east point of the Laguna Mountains and have been bought by the United States Government.—*Omaha Druggist*, Vol. XII, No. 2.

RHUS AROMATICA AS A REMEDY FOR ENURESIS IN CHILDREN.—In a recent issue of *Treatment*, Freyberger sums up his observations on the use of *Rhus aromatica*, in thirty cases of enuresis. The treatment was very successful, and while experience with the drug has been too limited to rank it as a specific for this disease, it may be said that it appears to be as efficacious as belladonna, that it may be given for a long time without the slightest ill effect, and that good results may be obtained with it when belladonna proves ineffective.—*Pediatrics*, January 1, 1899.

IMPROVING THE AIR IN WORKROOMS.—To one liter bottle of well water, add a spoonful of oil of turpentine, shake the liquid diligently until it becomes dim or white and distribute in the room, by means of an atomizer. One may also mix a few drops of acetic ether with the oil of turpentine. The refreshing effect of the quickly spreading, pleasant odor is astonishing.—*Kraft und Licht* through *Scientific American*, 1898, p. 394.

SPECIFIC AGAINST SEASICKNESS.—Bright red spectacles accompanied by internal doses of calomel, form a new German specific against seasickness. It is deduced from Epstein's investigations on the influences of color on the blood-vessels in the brain. Seasickness is due to lack of blood in the brain, while red sends blood to the brain with a rush. By looking at one point for some time through the red glasses, the patient is cured radically.—*Ibid.*, p. 394.

A METHOD FOR THE STORAGE OF EGGS, which was recently tried at Leith, is given in the issue of the *Scientific American* for January 21. The eggs are sealed in a storage apparatus which keeps them cool, and at the same time the arrangements are such that each egg has free access of air. The eggs are kept in an upright position, and are turned periodically so that the yolks are constantly imbedded in the albumen. This is accomplished by placing the eggs in frames, which by the action of a lever, can be inclined in different directions as needed.

CURIOUS ESCAPE FROM POISONING.—M. Cappelle, a pharmacist, at Tourcoing, and his family had a narrow escape a few days ago, but were saved by a happy hazard. The pharmacist's sister, Mlle. Cappelle, put some haricot beans to soak over night in an enamelled pan, and the next day cooked them in an iron saucepan. When the beans were served at table it was noticed that there were small globules of metallic mercury on the plates. The dish was put aside, and it is supposed that a criminal hand had poured corrosive sublimate on the beans while they were soaking. If they had been cooked in the enamelled pan, the whole family would probably have been poisoned, but the bichloride, by coming into contact with the iron saucepan, was decomposed, yielding the globules which attracted attention. The pharmacist's porter has been arrested on suspicion of the attempted crime, as he alone had the keys of the poison cupboard.—*Chem. and Drug*.

NOTES AND NEWS.

MR. A. C. WOOTTON, who has been editor of the *Chemist and Druggist* for over thirty years, tendered his resignation of that office on the 29th of June. This was in accordance with his decision expressed over two years ago. As stated by the proprietors, he leaves with the esteem and regret of themselves and his other associates.

PHILADELPHIA ASSOCIATION OF RETAIL DRUGGISTS.—The regular monthly meeting was held on Friday, July 7th, with President Wm. McIntyre in the chair. The names of thirty-eight new members were reported. In addition to the other business transacted, E. J. Finnerty, Jr., was elected a delegate to the National Convention at Cincinnati, in October. The Association is pushing the work of securing members, and an application blank and reading matter may be had by addressing the Secretary, W. A. Rumsey, 920 North Forty-first Street.

FRANKLIN INSTITUTE'S ANNIVERSARY.—An interesting feature of the Exposition will be the formal celebration of the seventy-fifth anniversary of the Franklin Institute, which will extend through one week. To each section has been assigned a day which will be devoted to illustrating the advances made in the special work which this section represents—that is, one day to chemistry, one day to electricity, one day to mining and metallurgy, one day to photography and microscopy, and one day to mechanics.—*Bulletin of the National Export Exposition*, Philadelphia.

A USEFUL PRESENT.—W. R. Warner & Co., of Philadelphia, New York and Chicago, are distributing free to doctors and druggists a very complete list of drugs, giving apothecary and metric doses. They are arranged in convenient columns and printed on coated linen cloth, size 22 x 14, for hanging at the prescription counter or in the doctor's office for ready reference. It will be sent to any doctor or druggist upon request. Drop them a postal for it.

OF INTEREST TO PHARMACISTS.—Messrs. Merck & Co. announced on July 1st that after that date the Merck Pharmacy would no longer serve the public nor the medical profession on prescription orders, nor on calls for supplies of any sort; and that all orders of this character must hereafter come from established pharmacists.

EXCURSION OF PARKE, DAVIS & CO.'S EMPLOYEES.—An enjoyable time was spent by the employees of this firm on Saturday, June 24th, on an excursion on the Detroit River, and at Tashmoo Park, this being the occasion of their ninth annual special holiday. The excursionists numbered 1,800 people, and according to the *Detroit Free Press*, constituted the largest picnic party which ever went out of Detroit.

HEROIN AND HEROIN HYDROCHLORIDE.—Dr. Goldmann, of Berlin ("Allg. Med. Central-Zeitung," No. 33, 1899), in an interesting review of the therapeutics of these remedies, states that heroin, owing to its difficulty of solution in water, is chiefly adapted for administration in powders or pills, while for administration in drops and mixtures, and especially for subcutaneous use, its water-soluble salt, heroin hydrochloride, is

particularly suitable. In preparing solutions of the latter the presence of alkalis, as for example bicarbonate of sodium, liquor ammoniæ and the like, should be avoided, as otherwise a precipitation of heroin occurs. For making solutions of heroin hydrochloride for hypodermatic use the water should be previously sterilized and allowed to partially cool before addition of the drug.

From the clinical reports thus far published (Professors Eulenburg and Leo, Drs. Manges, Freudenthal, Strube, etc.) it would appear that the dose of heroin and heroin hydrochloride in adults varies from $\frac{1}{24}$ to $\frac{1}{6}$ grain for internal administration, while for hypodermatic use it is recommended to begin with a minimum dose ($\frac{1}{24}$ grain), which is gradually increased if necessary.

THE GLUCOSIDE OF CASCARA SAGRADA.—In a monograph on "The History, Pharmacognosy and Chemistry of Cascara Sagrada" the authors, Alfred R. L. Dohme and Hermann Engelhardt, describe the method whereby they succeeded in isolating a glucoside of the drug. They have named the principle purshianin. It is analogous to frangulin, the glucoside of Buckthorn, in that it yields emodin on saponification. It is further described as a dark brown-red crystalline substance, melting at 237° C., and also as being soluble in alcohol, ethyl acetate, acetone, alkalies and hot water. The authors intend to continue their investigations so as to show wherein purshianin differs from frangulin, or to establish the identity of these glucosides.

HYALODENDRON NAVALIUM, a new genus and species of euplectellid sponge.—This plant is described by J. Percy Moore (Proceedings of the Academy of Natural Sciences, 1898), and the following statement concerning its occurrence accompanies the description: The type of this genus and species is one of a small collection of silicious sponges gathered in Japan in 1893, by Mr. Frederick Stearns, of Detroit, Mich., and sent to the Academy of Natural Sciences of Philadelphia, for determination. They were collected by native fishermen and brought into Yokohama harbor by the dredge boats. The single specimen of *Hyalodendron* is the only one which had been reported by the fishermen. Other than this, no data relating to the collection are available. The specimens are accompanied by a set of sketches by a native artist.

REACTION FOR VANILLIN.—A very characteristic reaction for vanillin, according to Welmans, is the following: 0.1 gramme of vanillin is dissolved in 2 c.c. concentrated H_2SO_4 , to which 0.1 gramme of α -naphthol is added. Upon agitation there develops a very characteristic bluish-red coloration. If one employs instead 0.1 gramme β -naphthol, there results an emerald green color changing to a yellowish-red.—*Chem. Zeit.*, 1898, p. 248; from *Pharm. Zeit.*, 1898, 634.

FORMIC ACID OF ANTS —C. Janet (*Compt. rend.*, cxxvii, 130) has ascertained that in the region of the mouth, ants secrete an alkaline liquid. From the glands in the abdominal region formic acid is secreted, which is secreted only when the ants are in the act of flight. The latter is neutralized by the former, which is secreted by the ants when undisturbed, and is considered to furnish an "autointoxikation."—*Sudd.-Apoth.-Zeit.*, 1898, 622.

ALGAL FLORA OF THE HAMBURG WATER WORKS.—In a work on this subject, Herr O. Strohmeier states that the green algæ—*Cladophora*, *Spirogyra*, *Euteromorpha*, *Stichococcus*, etc.—have a very powerful effect in purifying water

by the destruction of bacteria through the agency of the oxygen which they exhale. Those algæ, on the other hand, which are inclosed in a mucilaginous sheath, especially diatoms, have a very prejudicial effect on drinking water by stopping the filters through which it passes.—*Scientific American*, Vol. LXXIX, No. 13, p. 194.

IGNORANCE AND INFANT MORTALITY furnishes the subject of an editorial, in the issue of *Pediatrics*, for January 15th, which should find its way into lay publications. Reference was made to a "Howard Medal Prize Essay," by Hugh R. Jones, in which he stated that diarrhœa is exceedingly fatal during the first year of life—more especially during the earlier months. This fatality, in great measure is due to the improper feeding of infants. Owing to the neglect and ignorance of mothers the infants are fed on contaminated milk or other food. Among the data presented by Dr. Jones was a table, from a report of the sanitary condition of Boston in 1875, which showed that in the New England and the Middle States the infant mortality from cholera infantum and diarrhœa was in proportion to the illiteracy. Dr. Vernon, Medical Officer of Health for Southport, England, was quoted as saying: "My belief is that all the principal causes of infantile mortality are mostly results of ignorance—ignorance of the modes of spreading and means of restricting dangerous diseases; ignorance of the practical application of bacteriology and mycology to every-day affairs, particularly to food, water and food materials, on which human existence depends; ignorance of the effects of exposure of children to the ordinary atmospheric conditions; ignorance of that sort of knowledge which Herbert Spencer characterized as of 'most worth'—knowledge which tends to directly preserve life; knowledge which it should be the function of the public school system to make paramount 'because the life of the people is the supreme law.' "

TEA AND RHEUMATISM.—The habitual use of tea as a means of relieving headache is without doubt an efficient cause of rheumatism in numerous ways. The writer has met many persons who could not forego the morning cup of tea or coffee without suffering severely from headache and depression during the day. Haig has shown that a dose of uric acid will cure a headache, by driving the uric acid out of the blood. The day following, however, the reverse condition exists. The amount of uric acid found in the blood is increased, and a new dose must be given to protect the nervous system from the result of the contact of this nerve poison. The thein or caffein of tea has precisely the same effect as uric acid, and hence has come to be a favorite domestic remedy for headache. When used habitually, however, as will readily appear, the effect must be to cause a storing up in the body of uric acid and urates, thus laying the foundation for chronic rheumatism and the various allied conditions which have their foundation in the so-called uric acid diathesis or lithemia.—Editorial in *Good Health*.

TESTING SPIRITS OF TURPENTINE.—C. B. Dudley and F. N. Pease (Abs. in *Jour. Amer. Chem. Soc.*, 1898, p. 61) employ four tests: Specific gravity, distillation-point, residue on evaporation, and treatment with oil of vitriol. The gravity is determined by the Westphal balance, and varies from 0.862 to 0.872. The distillation-point is determined by boiling 100 c.c. in a 500 c.c. distillation flask. This point varies from 305° to 308° F. (152°–153° C.) and 29 inches

pressure, with the thermometer wholly in the vapor. For the residue on evaporation, 20 grammes of the sample are weighed into a 100 c.c. platinum dish and evaporated not above 250° F. (121° C.). The residue should not exceed 2 per cent. and usually does not exceed 1. The evaporation should take place at 100° C. in cases of dispute. The treatment with oil of vitriol is based upon the fact that pure oil of turpentine is almost wholly polymerized and dissolved by sulphuric acid. Six c.c. of the sample are placed in a 30 c.c. tube, graduated to tenths, held under a cold-water faucet and slowly filled with C.P. sulphuric acid. It is allowed to cool, the tube corked and the contents mixed five or six times, cooling, if necessary. The tube is placed vertically and allowed to stand half an hour. The material unaffected by the acid is the adulterant and its volume is measured. It is not usually more than 3 per cent.

POWDERED DRUGS.—The following table, taken from the *Helfenberger Analen*, 1897 (*Pharm. Zeit.*, 1898, 319), gives the maximum size of the particles, in microns, and the amount of water contained in the same :

Substance.	Maximum Size in Microns.	Per Cent. of Water.
Cantharides	243'00	5'00-15'00
Flor. Chrysanthemi	255'00	5'55-13'95
Fol. Sennæ (Alex.)	234'00	9'20-16'50
Fol. Sennæ (Tinevelli)	164'00	4'20-14'50
Herb. Belladonnæ	145'80	6'50-12'25
“ Conii	133'65	6'20-14'95
“ Digitalis	147'15	3'80-13'57
“ Hyoscyami	148'50	5'83-10'45
“ Meliloti	155'25	6'25-13'55
Rad. Althææ	162'00	5'15-12'65
“ Glycyrrhizæ (Sp.) } “ “ (Rus.) }	229'50	3'50-13'50
“ Rhei I } “ “ II }	275'40	4'45-12'00
Sem. Fœniculi	184'95	9'95-13'55

THE STRUCTURE OF PROTOPLASM.—Dr. E. B. Wilson has made a critical study of the living protoplasm and finds (*Science*, July 14, 1899) that in the Echinoderm-eggs it is a mixture of liquids, in the form of a fine emulsion consisting of a continuous substance in which are suspended drops of two general orders of magnitude and of different chemical nature, as indicated by their staining reactions. He further considers that the astral rays in Echinoderms grow by progressive differentiation out of the general cytoplasmic meshwork, and that there is no ground, in the Echinoderm-egg, at least, for the recognition of a specific “archoplasm” or “kynoplasm” from which they arise. The entire coarser alveolar structure, *i. e.*, the foam structure of Bütschli, is in the eggs of secondary origin. He agrees with Kölliker that no universal or even general formula for protoplasmic structure may be given.

NOTES AND NEWS.

DR. A. R. L. DOHME has been elected President of the Maryland State Pharmaceutical Association.

PROF. ROBERT BUNSEN, the distinguished chemist and physicist, died at Heidelberg, Germany, on August 16th, in the 89th year of his age. An appropriate notice of his life and scientific work will appear in a later issue of this JOURNAL.

MR. E. M. HOLMES, F.L.S., curator to the museum of the Pharmaceutical Society (London), has been elected President of the British Pharmaceutical Conference for next year. Mr. Holmes is considered to be one of the greatest of living authorities upon the subject of *materia medica*, and it was in recognition of the value of his work in connection with this subject that he was awarded the first Flückiger medal in 1897 by the German *Apotheker Vereine*.

THE HANBURY MEDAL for 1899 has been awarded to Prof. Albert Ladenburg, Ph.D., M.D., now of Breslau, but formerly Professor of Chemistry and Director of the Chemical Laboratories of the University of Keil. Since the establishment of the memorial in honor of the late Daniel Hanbury for his distinguished services in promoting a knowledge of the natural history of drugs, it has been customary to award a gold medal biennially for this and other investigations relating to drugs. On the present occasion the adjudicators were Dr. Günther, President of the Linnean Society; Dr. T. E. Thorpe, President of the Chemical Society; Mr. William Martindale, President of the Pharmaceutical Society of Great Britain; Mr. J. C. C. Payne, President of the British Pharmaceutical Conference, and Mr. Francis Ransom. Professor Ladenburg's work lies principally within the domain of organic chemistry, his most notable researches having been on the constitution and synthesis of the alkaloids. Following are the names of those who have previously received the medal: Friedrich August Flückiger, 1881; John Eliot Howard, 1883; Georg Drenden-dorff, 1885; William Dymock, 1887; Gustave Planchon, 1889; Julius Oswald Hesse, 1891; Johann Michael Maisch, 1893; August E. Vogl, 1895, and John Elishu De Vrij, 1897.

The August *Coming Age* contains a paper of great interest by Prof. A. E. Dolbear, the well-known physicist. It is entitled "The Kind of Universe We Live In," and discusses in a brilliant manner the results of discoveries made through the telescope, spectroscope and microscope.

WARNER'S POCKET MEDICAL DICTIONARY has been carefully revised, and will be sent to any address upon receipt of 75 cents, in stamps or money order. Address W. R. Warner & Co., Philadelphia.

EXPOSITION OFFICIAL CATALOGUE.—The first edition of the Official Catalogue of the National Export Exposition, to be held in Philadelphia this fall will be issued about September 10th.

It will be a book $5\frac{3}{4} \times 8\frac{1}{4}$ inches, with about 160 pages, and will contain the following information:

A plan of the grounds and buildings of the Exposition.

Photographs of its principal officers.

Photographs of the buildings.

A description of the buildings.

A list of the officers of the Exposition and of the commissioners accredited thereto.

A list of the committees of the Exposition.

A key to the system of installation (about one-half page).

Ground floor plans of the several buildings.

Classification of each group.

A sketch of the Commercial Museum.

A sketch of the Franklin Institute.

In the Catalogue proper will appear a list of exhibits with the name of the exhibitor, carefully arranged in groups, and groups and exhibits serially numbered. A terse description of each exhibit, calling attention to its important feature, is also permitted to follow the auditing of each exhibit. This Catalogue will be replete with interesting and valuable information, and will serve not only as a guide to visitors at the Exposition, but is sure to be preserved as a book of reference.

CHICAGO VETERAN DRUGGISTS' ASSOCIATION.—One of the objects of the Chicago Veteran Druggists' Association, aside from its social features, is the collection and compilation of a historical record of Pharmacy of early Chicago, and its preservation for the future by committing it to the care of some institution like that of the Historical Society of Chicago. To accomplish this object and to have it historically correct will require the aid and co-operation of those who possess a recollection of the Drug Trade of Chicago prior to the big fire in 1871.

Information concerning the organization and its plan of work may be had by addressing the historian, Albert E. Ebert, 426 State Street, Chicago.

ALUMNI ASSOCIATION OF THE CINCINNATI COLLEGE OF PHARMACY.—At the annual meeting of the Association, held recently, the following officers were elected for the ensuing year: President, Prof. Charles Apmeyer; First Vice-President, Prof. Charles W. Ford; Second Vice-President, Miss Marie Kussnick; Secretary, John Weik; Treasurer, Prof. Charles T. P. Fennel; Corresponding Secretary, Louis Klayer; Executive Committee, Prof. Louis W. Sauer, Dr. Otto Dickmann, Ralph Freiberg and George Theobald; Entertainment Committee, Louis Klayer, B. Fries and Miss Marcella Feth; Managers of the *Alumni Journal*, Profs. Charles T. P. Fennel and Julius Eichberg; Auditing Committee, Joseph Koenig, R. Freiberg and Prof. Louis W. Sauer.

The Association has a membership of 540, and is the third largest of its kind in the United States.

A UNIVERSAL LANGUAGE FOR MEN OF SCIENCE.—At a recent meeting of the Prussian Academy of Sciences, Professor Dills spoke of the need of a universal language for men of science. He considers Volapük an artificial product of little use. English is his choice as the world-language, because of its wide prevalence, and because its simple structure and grammar make it eminently suitable for such use.—*Medical News*.

THE RECENT GRADUATE is theoretically, as a rule, ahead; practically, the man of some years' experience is ahead. Experience and knowledge of medicine are not synonymous. Experience indicates that a practitioner is a good judge of human nature, rather than that he possesses a broad knowledge of medicine.—*The Eclectic Med. Jour.*, 1898, p. 597; from *S. W. Med. and Surg. Rep.*

NOTES AND NEWS.

THE NATIONAL ASSOCIATION OF RETAIL DRUGGISTS held its second annual meeting in Cincinnati from October 3 to 6, 1899. There were a large number of delegates present, and the earnestness, sincerity and enthusiasm with which the members went at their work was very gratifying, and speaks well for the future of the organization. The Philadelphia Association of Retail Druggists was represented by Wm. McIntyre, James C. Perry, W. H. Foley, E. J. Finnerty and W. A. Rumsey. The address of the President, H. P. Hynson, Baltimore, Md., was appropriate and characterized by good sense and an appreciation of existing conditions. The report of the Secretary, Thomas V. Wooten, showed that an immense amount of work had been done towards arousing the entire retail trade of the country to the necessity for organization and representation in the N. A. R. D. Not only was the report of the Secretary encouraging in this direction, but it was further shown that the various State pharmaceutical associations were in sympathy with the organization, and that the work of the various pharmaceutical journals in giving the widest publicity to the work of the Association was much appreciated.

In the report of the Committee on Education and Legislation, Mr. W. C. Anderson, Brooklyn, urged the Association to cooperate with the American Pharmaceutical Association in securing uniformity in educational matters and pharmacy laws. Mr. Frank E. Holliday, Chairman of the Executive Committee, made a most encouraging report, in that 90 per cent. of the members of the Proprietary Association were now limiting the distribution of their goods according to the resolution requiring proprietary manufacturers to limit their sales to certain distributors approved by the Proprietary Goods Committee of the N. W. D. A., the Proprietary Association and the Executive Committee of the N. A. R. D. The report of the Treasurer, John W. Lowe, showed a balance of \$544.17. The Nominating Committee reported the following names of members for the respective offices, who were duly elected :

President, Simon N. Jones, Louisville, Ky.; Vice-Presidents, Wm. C. Anderson, Brooklyn, N. Y.; Thos. Layton, St. Louis, Mo.; Alex. M. Robinson, Bangor, Me.; Secretary, Thos. V. Wooten, of Chicago; Treasurer, Chas. T. Heller, St. Paul, Minn. Executive Committee: F. E. Holliday, Topeka, Kan.; H. P. Hynson, Baltimore, Md.; J. W. Cheswright, Pittsburg, Pa.; D. E. Prall, Saginaw, Mich.; A. Timberlake, Indianapolis, Ind.; Alfred De Lang, Cincinnati, O.

The Association has wisely strengthened its position taken last year, and is deliberating upon its proceedings to such an extent that no one concerned, either directly or indirectly, in the work of the N. A. R. D. can feel other than confident that the members are laboring in a just cause, and that the methods pursued will be wise, honorable and effective.

THE PHARMACIST OF THE "OLYMPIA"—Dewey's pharmacist, Alrik Hammar, was the recipient of a loving cup from the pharmacists of New York at a banquet held in New York City, on September 30th, at which nearly 200 pharmacists were present. A number of addresses were made by representative pharmacists of New York City and vicinity. Prof. H. H. Rusby presented the loving cup in behalf of the pharmacists of New York City and vicinity. Mr. Hammar, in accepting the cup, responded in a few modest but appropriate words.

SEVENTY-FIFTH ANNIVERSARY OF FRANKLIN INSTITUTE.—A series of meetings celebrating the seventy-fifth anniversary of the founding of the Franklin Institute were held in the Convention Hall of the National Export Exposition during the week beginning October 2d. The more exact time for holding this celebration would have been in February last, but, owing to the Institute's part in carrying forward arrangements for the Exposition, it was deemed more appropriate to hold it at the time named.

The first five days of the week were devoted to the several sections of the Institute in the order of their seniority, the exercises of the sixth day being such as pertained generally to the work of the Institute.

The opening meeting of the series was that of the Chemical Section. President John Birkinbine, of the Institute, made an address previous to the exercises proper of the Section, and Dr. W. P. Wilson welcomed the members on behalf of the Exposition. An introductory address was then made by Dr. Joseph Richards, President of the Section, which was followed by an address by Harvey W. Wiley, of Washington, D. C., upon the "Progress of Chemistry as Applied to the Arts," and an essay by Charles F. Himes, Carlisle, Pa., upon "Photography and Microscopy in their Application to the Arts."

Tuesday was devoted to the Electrical Section, and the first address was made by the President of the Section, Prof. George J. Hoadley, followed by an address by Dr. Edwin J. Houston, upon "The Seventy-fifth Anniversary of the Franklin Institute from an Electrical Standpoint;" and an address by Mr. Ralph W. Pope, of New York, upon "The Influence of Such Societies as the Franklin Institute and the American Institute of Electrical Engineers in Promoting the Progress of the Electrical Arts."

On Wednesday, Mr. James Christie, of Philadelphia, President of the Mining and Metallurgical Section, delivered the introductory address, followed by Mr. Charles Kirchhoff, of New York, on "Three-quarters of a Century's Progress in Mining and Metallurgy," and by Mr. John Fritz, Bethlehem, Pa., on "The Development of Iron Manufacture During the Last Three-quarters of a Century."

Thursday the exercises of the Mechanical and Engineering Section were held, and consisted of an address by the President of the Section, Mr. Wilfred Lewis, Philadelphia, and an address by Dr. Coleman Sellers, Philadelphia, on "The Progress of the Mechanical Arts in Three-quarters of a Century."

The exercises of the Physical and Astronomical Section on Friday consisted of an introductory address by the President of the Section, Dr. A. E. Kennelly, of Philadelphia, and an address by Dr. T. C. Mendenhall, Worcester, Mass., on "The Progress of Physics and Astronomy."

The proceedings on Saturday were given to a general celebration of the anniversary, and the day was known as "Institute Day." The President of the Institute, Mr. John Birkinbine, presided, and made an address reviewing the history of the Institute and its achievements in promoting science and the advancement of the industrial arts. Rear-Admiral George W. Melville, Engineer-in-Chief of the United States Navy, delivered an instructive address upon "The Warship as Combining in Itself the Highest Results of Skill, Ingenuity and Scientific Knowledge." Robert H. Thurston, ex-President of Cornell University, read an interesting essay on "The Evolution of Technical Education and Its Progress During the Past Seventy-five Years."

POISON SUMAC.—*Rhus vernix*, L., [also known as swamp sumac, dogwood (Massachusetts), poison dogwood, poison elder (Alabama), poison ash (Vermont), poison tree, poison wood, poison swamp sumac, thunderwood (Georgia and Virginia)] is a shrub from 6 to 30 feet high, with long pinnate leaves, having from 7 to 13 leaflets. The wood has a faint sulphurous odor,

which, together with the leaf scars, which are very prominent, enables one to distinguish the plant from other shrubbery in winter. It grows in swamps and damp woods from Canada to Florida and westward to Louisiana.

The effects of the poison are the same as that of poison ivy, and cases require the same remedy. Evidently the active principle is an oil similar to that isolated by Pfaff from *Rhus radicans*, L. It is highly desirable that legal measures be adopted compelling the destruction of these plants where they abound in cities and in places of popular resort. This can be managed without much danger from the poison, and is a matter of very general public interest. Owing to the fact that many individuals are practically immune from the effects of poison ivy, advantage should be taken of this fact to employ such individuals to remove these plants from the vicinity of dwellings and from playgrounds. Much of the work would be purely mechanical, consisting in rooting the plants up by main force. This is the most certain method; the use of concentrated sul-



phuric acid is attended with less danger, as the plants do not need to be touched. A half teaspoonful should be applied to the stem every two or three weeks in the spring time when the plant is growing most vigorously. Care should be taken to keep the acid away from the skin, as it is most highly corrosive. The brush should in no case be left upon the ground nor the wood used for fuel. In burning the refuse in the field, pains should be taken not to inhale the smoke nor to handle the wood any more than necessary.

The greatest care should be exercised in preventing workmen from trans-

ferring the oil from their clothes and hands to other individuals. To accomplish this object special suits should be worn, and the hands should be washed several times a day with an alcoholic sugar of lead solution (alcohol (50 or 75 per cent.) nearly saturated with sugar of lead). Bathing in hot water with strong soap-suds is recommended. The clothing must also be well washed, and it is always well to remember that towels may be a means of conveying the oil.—Bull. No. 20, U. S. Depart. of Agric., Division of Botany.

JEFFERSON MEDICAL COLLEGE.—The exercises at the formal opening of the new Medical Hall, Jefferson Medical College, were attended by an enthusiastic assemblage. Dr. Thomas A. Emmet, a distinguished graduate of 1851, presided. The address of the evening was delivered by Phineas S. Conner, Professor of Surgery in the Ohio Medical College. Following Dr. Conner, Surgeon-General George M. Sternberg, U. S. A., made a short address. Before the exercises a banquet was given by Hon. William Potter to the members of the Faculty, Board of Trustees and to the guests of the evening.

A MEMORIAL TO DR. MUELLER.—It is reported that a memorial to Dr. Mueller, who lost his life while studying the plague a year ago in Vienna, is about to be unveiled.—*Boston Med. and Surg. Rep.*, 1899, p. 351.

NO RIGHT TO TERMINATE LIFE.—The question of whether or not the physician ever has the right to terminate life, either that of a patient hopelessly ill and suffering intense agony, or that of a newly-born monstrosity, has been very interestingly discussed, from an ethical rather than from a legal standpoint, before the Medico-Legal Society. Legally speaking, no such right exists.—*N. Y. Med. Jour.*, 1899, p. 529.

THE MOTH-BALL AND MOSQUITOES.—A moth-ball rubbed upon a mosquito bite has considerable efficacy in allaying the itching. Moreover, when rubbed upon the face and hands it seems to keep the mosquitoes away.—*Ibid.*, p. 533.

A FERTILE HYBRID PIGEON.—C. O. Whitman, of the University of Chicago, is reported to have succeeded in raising a fertile hybrid pigeon. This means the making of an entirely new species of pigeons, and is a scientific achievement which has been supposed impossible. The mother of the hybrid bird was a Japanese turtle dove, and the father a common rough pigeon.—*Med. News*, 1899, p. 468.

DANGEROUS FLOWERS.—M. Domingos Freire (*Journal de médecine de Paris*, September 3d), as a result of researches instituted by him on flowers, shows that flowers can afford a resting place to saprophytic and pathogenic microbes, and thus become a source of contamination. He thinks, moreover, that some relation exists between the colors of flowers and the pigment elaborated by the microbes which find shelter in them. The rosy tint of the Rothschild rose is similar to that of a plate culture of *Leptothrix ochracea* before it arrives at the brick-red stage. The egg-yolk yellow colonies of *Micrococcus cruciformis* he finds to be of the same tint as that of the coloring matter on the anthers of the *Hibiscus rosa sinensis*. Furthermore, many kinds of microbes that the author would term "osmogenous" reproduce odors resembling those disengaged by the essences of the plants in which they live.—*N. Y. Med. Jour.*

NOTES AND NEWS.

AMERICAN PHARMACEUTICAL ASSOCIATION.—General Secretary Professor Charles Caspari, Jr., announces that "The Council, having been charged with fixing the date for the next annual meeting of the American Pharmaceutical Association, to be held at Richmond, Va., in 1900, has decided to name May 7 to 12, inclusive, as the time for holding the meeting."

THE PENNSYLVANIA STATE PHARMACEUTICAL EXAMINING BOARD will hold its next meeting in the Central High School Building, corner Broad and Green Streets, Philadelphia, on Saturday, January 20, 1900, between the hours of 12 and 5 P.M. Application blanks and all other information will be furnished by the Secretary, Charles T. George, Harrisburg, Pa.

NATIONAL ASSOCIATION OF RETAIL DRUGGISTS.—The office of the national secretary, Thos. V. Wooten, has been removed to the Association Building, 153-155 La Salle Street, Chicago. The secretary's office is the property of the national association and is at the command of its members whenever its services can be used. A cordial invitation is extended to the membership to visit the office when in Chicago. Each member of the N. A. R. D. should feel that he has a personal interest in the national headquarters and the work being done there for the advancement of the association's welfare.

PHILADELPHIA ASSOCIATION OF RETAIL DRUGGISTS.—At the regular meeting, on November 3d, J. C. Perry, Chairman Executive Committee, reported eight new members, and also that a Committee of Three, as follows: Wm. McIntyre, Jas. C. Perry and W. A. Rumsey, had been appointed to wait on the wholesale houses who conducted a retail counter and sold goods at retail. The Committee hope to have their report ready by the next meeting. President McIntyre, Chairman, gave a report of the delegates' trip to Cincinnati. The next meeting will be held Friday, December 1st, at the Philadelphia College of Pharmacy, at 3 P.M. This will be the first annual meeting, and officers will be elected to serve for the ensuing year.

PROF. JOHN URI LLOYD has arranged with Dodd, Mead & Co. for the publication of his book "Stringtown on the Pike." This work promises to be even more original and unique than "Etidorhpa," and will be welcome news, particularly to the members of the American Pharmaceutical Association, who heard some selections from it at the meeting at Put-in-Bay.

A LEGAL DECISION ON SUBSTITUTION.—A decision of considerable importance was made by Judge Kohlsaat in the United States Circuit Court at Chicago, on October 13, 1899. In a bill for an injunction, Fairchild Brothers & Foster, of New York, had charged a Chicago druggist with substituting a spurious and inferior preparation for "Fairchild's Essence of Pepsine," in several cases where the latter was expressly called for in physicians' prescriptions. Judge Kohlsaat's decree sustains the charges made, perpetually enjoins the druggist from ever repeating the offense and taxes him with the costs, amounting to about \$500. "This is said to be the first contested case in the United States in which the principle of protection to trade-marks and trade names was extended so as to apply to what is technically known in the drug business as 'substitution.' Judge Kohlsaat's decision will probably protect manufacturing chemists, physi-

cians and the general public, all of whom have in the past suffered from these fraudulent practices of a certain class of druggists."

In this connection we would refer to an editorial in this JOURNAL in April, 1897, in which the opinion was given that a pharmacist "has no right to substitute his own or anybody else's preparation for the one specified, even if he is sure that the substitute is as good or as he may think better."

PERFECTION IN MECHANICS.—Thomas S. Wiegand, in speaking of a recent visit which he made to the Philadelphia Mint, said that he was shown a wonderful assay balance, recently constructed for the use of the chief assayer, by Henry Troemner, of Philadelphia, which is a triumph of the scale maker's art. It easily indicates the one two-hundredth part of a milligramme. This, if stated in Troy weight, would equal about the one thirteen-thousandth of a Troy grain, making it probably the most sensitive scale in America. Its general construction is of the highest order of mechanism. All the working parts are set with agate bearings; the beam is made of pure aluminum and colored a jet black, while the divisions and markings are filled with white enamel. This is done to relieve the eye in the reading of same, making that operation one of ease and comfort, as the reflection of any polish is thus totally obviated.

INJECTIONS OF PIPERAZIN (each consisting of 8 minims of distilled water and five-sixths of a grain of piperazin) have been successfully employed by Giofredi (*Gazetta degli Ospedali*, August 20, 1899) to remove a uratic deposit from the tendon-sheath of the peroneus longus. The author expresses the opinion that gouty joints might be as successfully treated in a similar way, if strict antiseptic precautions were used.—*Phil. Med. Journal*, October 28, 1899.

LIQUID AIR AS A DRINK.—M. D'Arsonval had offered a guest some liquid air mixed with champagne, and he, without waiting till the champagne thawed, swallowed the whole glassful, containing about 15 c.c. of liquid air. After a few moments, his stomach was acutely distended, but a sudden violent expulsion of food and gas relieved this condition.—*Scientific Amer.*, 1898, p. 218.

NITRATES IN PLANT TISSUES.—Berthelot has conceived the idea that plants have the power of producing nitrates in their own tissues. This assumption, if proved, would furnish an entirely new departure in vegetable physiology.—*Chem. and Drug.*, 1899, p. 678.

DETECTION OF CARAMEL IN SPIRITS AND VINEGAR.—C. A. Crampton and F. D. Simons (*Jour. Amer. Chem. Soc.*, 1899, p. 355) find that Fuller's earth may be used in detecting caramel in spirits and vinegar, owing to the fact that Fuller's earth removes a greater percentage of coloring from the artificially colored samples than from those naturally colored from the wooden containers.

DEFENSIVE REACTION OF THE ORGANISM.—Soulier attributes the agglutination reaction to the general plan of defense of the organism against infections and considers intravascular injections the promptest means to place the medicinal agent at once where it will most effectually sustain the elements of the organism in their struggle.—*Progres. Med.*, X, 30; *Jour. Am. Med. Assoc.*, 1899, p. 1183.



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Beta-Naphtol-Vasogen	10%
Menthol-Vasogen	2%
Sulphur- "	3%
Tar- "	25%
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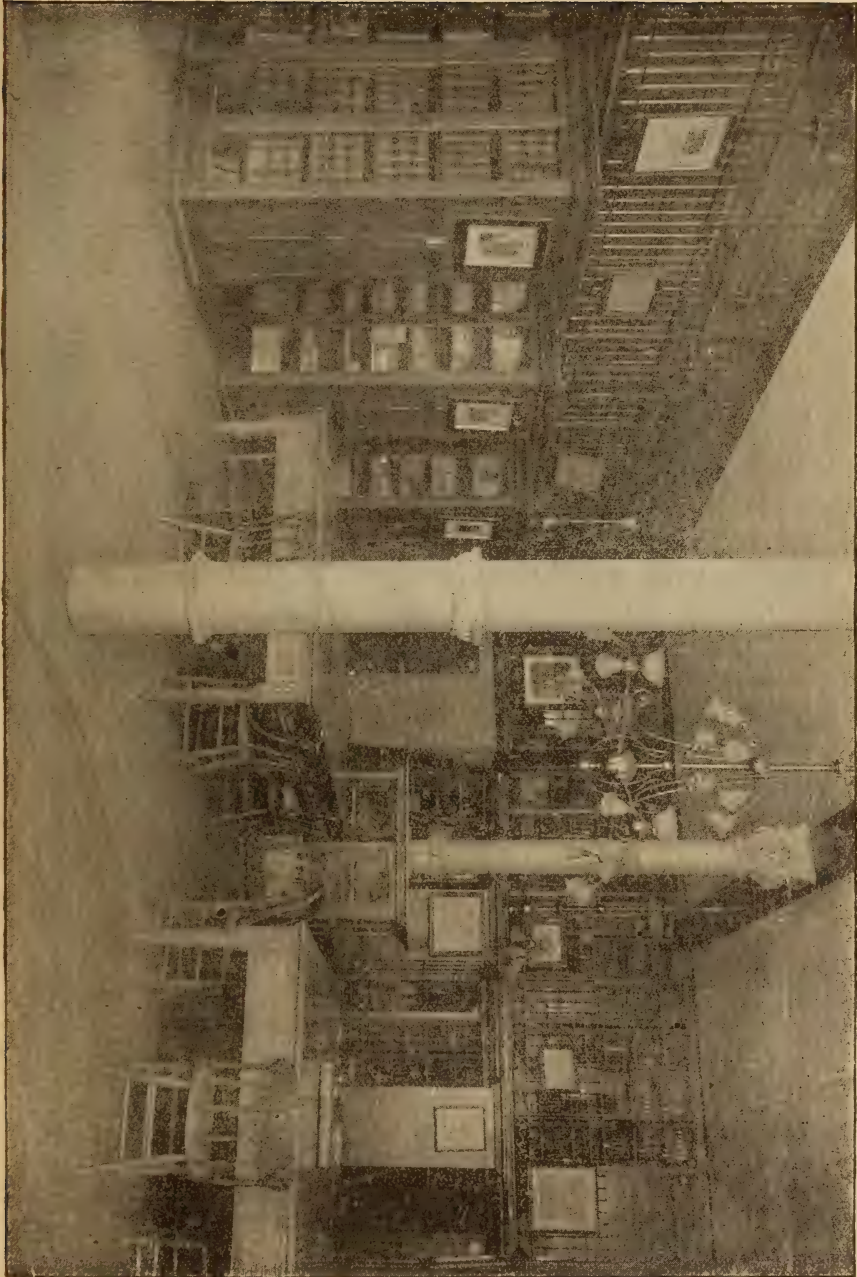
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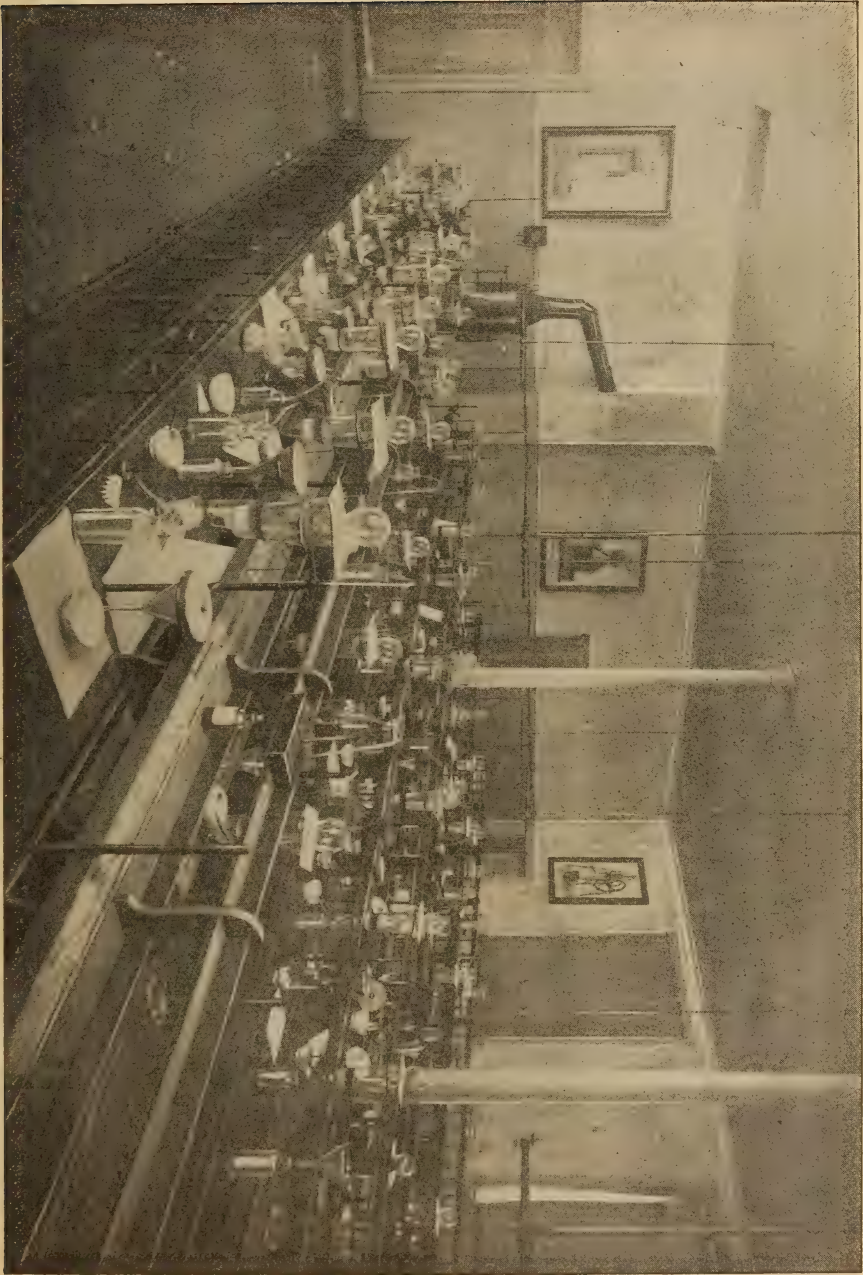
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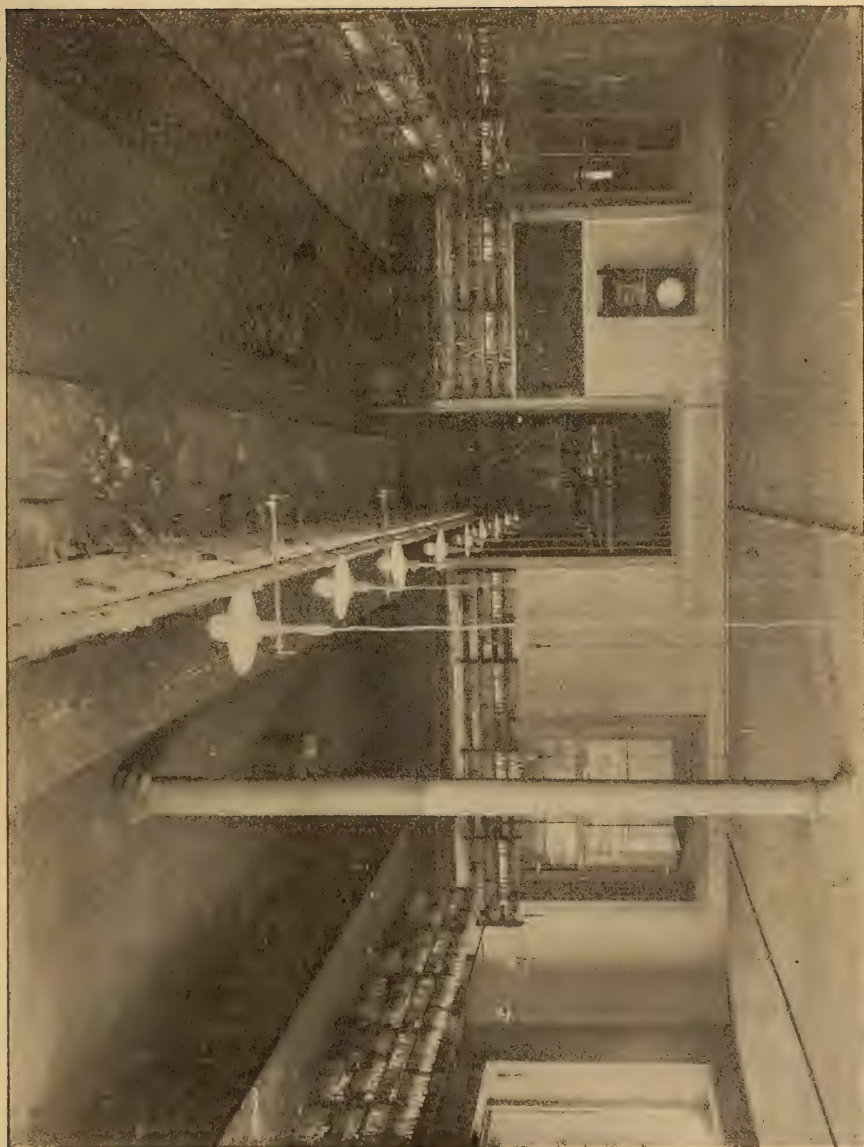
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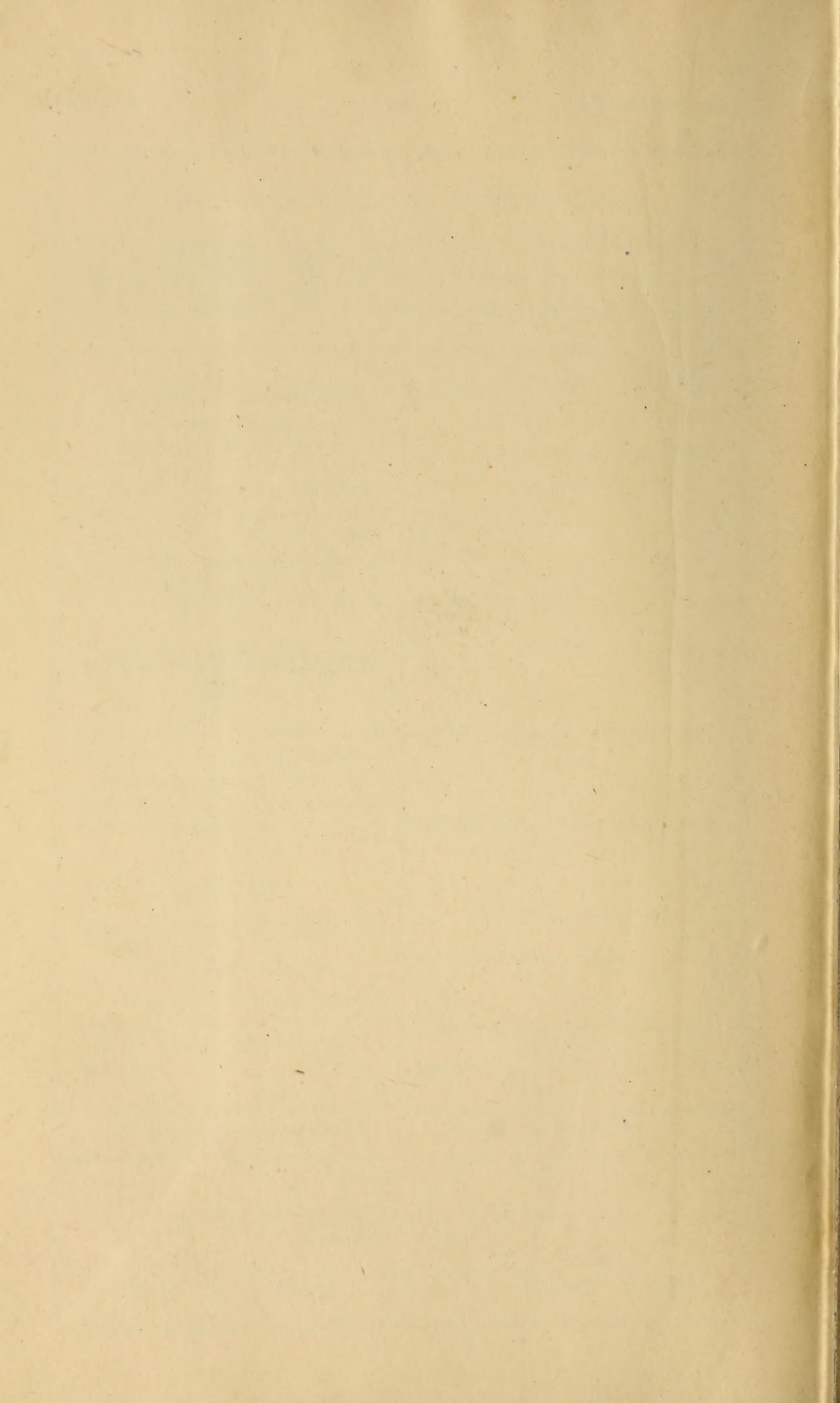
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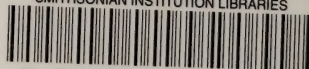
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